BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 48] 1951 [No. 5

SUMMARY OF RECENT ABSTRACTS*

IV. TRYPANOSOMIASIS

African Trypanosomiasis

General : Epidemiology

Lester (p. 819) supplies a report on the work of the East African Tsetse and Trypanosomiasis Research and Reclamation Organization during 1949 in which he mentions Fairbairn's work on *Trypanosoma rhodesiense* maintained in sheep. Discriminative clearing has been very usefully applied in Tanganyika Territory against *Glossina morsitans*. BHC smokes have shown some success against *G. swynnertoni*.

In a discussion on sleeping sickness in Uganda (p. 526) the speakers made the point that the recent cases were probably due to *T. rhodesiense*, though the clinical manifestations in many were like those of *T. gambiense* infection. MacKichan gave an unfavourable account of the diamidines, and Lourie, in comment, remarks that almost nothing has been recorded on the action of these drugs in *T. rhodesiense* infection.

McLetchie (p. 330) contributes his annual report on the Sleeping Sickness Service of Nigeria for 1948, in which he states that more than one million people were examined. In one endemic area the index of infection was 1 per cent., with 4·4 per cent. in parts of it, but in others the rate was down to 0·1 per cent. About one-fifth of the cases treated at dispensaries are relapses. Mass prophylaxis with pentamidine given every 4–5 months is practised with apparent success in the two principal mining areas. Tsetse control is actively carried out in certain parts, and the Anchau Corridor is maintained free from fly. This Corridor is now thriving, and mixed farming is flourishing. The Field Units provided by the Sleeping Sickness Service deal with serious outbreaks of cerebrospinal fever and relapsing fever, which occur on a large scale in certain areas.

An account is given by Le Rouzic and Koch (p. 444) of the institution in French West Africa of the sleeping sickness service with its mobile teams in 1932 ; this was developed into the autonomic service for the whole area, responsible directly to the Governor-General, and eventually into the general mobile health service in 1944. This now deals with malaria, leprosy and other conditions besides sleeping sickness. In 1948 there were 16 officers and 35

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

African doctors, in addition to a numerous staff. About 4½ million people have been examined in some years. The index of trypanosome infection has fallen from 1·75 to 0·35 per cent. Diamidines are increasingly used in treatment and prophylaxis, and increasing reliance is placed on drug prophylaxis, though bush clearing is performed extensively in savanna country.

LE ROUZIC (p. 446) discusses the incidence of blood infections in French West Africa, and the questions of reinfection, relapse and drug resistance.

FERREIRA (p. 966) reports on the sleeping sickness mission in Portuguese Guinea for the year 1948, which revealed 1,272 cases, more than in either 1947 or 1946. Studies were made on trypanosomes and tsetse flies.

Aetiology

LAUNOY (p. 17) has recapitulated his researches on experimental trypanosomiasis since 1926.

TOBIE *et al.* (p. 604) describe a blood agar culture medium for the cultivation of *T. rhodesiense* and *T. gambiense*. They note that these strains are difficult to cultivate after they have been maintained by animal passage for a long time. Physiological findings are described.

BÜLBRING *et al.* (p. 119) have shown that *T. rhodesiense* can synthesize acetylcholine, but that *Plasmodium gallinaceum* cannot do so. They suggest that its presence in the one and absence from the other may be associated with the fact that trypanosomes are highly motile and plasmodia relatively immobile.

LAUNOY (p. 20) discusses the increase in virulence which has taken place in a neurotropic strain of *T. gambiense* maintained in rats ; he thinks that this exaltation of virulence may be the result of passage through 5 very young rats in 1948.

WAGNER (p. 719) discusses the vital staining of trypanosomes with acridine orange.

Transmission

A coloured map of the types of vegetation present in Tanganyika Territory was prepared by GILLMAN (p. 215) before his death, and was published in 1949, together with a long article in which photographs accompanied the text. This map has a strong bearing on the tsetse flies of the country. The author also reproduced his uncoloured population map, with amendments, in the same article ; this was first published in 1936.

JACKSON (p. 718) has shown that the estimation of age by the fraying of the wings is valid in tsetse flies in either the wet or the dry season.

FAIRBAIRN and CULWICK (p. 605) refer to the importance of temperature acting on the pupae of tsetse flies, in relation to subsequent infection rates with *T. rhodesiense*, and they confirm BURTT's view that these rates are higher in flies from pupae maintained at 28°C. than at lower temperatures. It seems that temperature is therefore in this respect a factor in the incidence of *T. rhodesiense* infection.

LEWIS (p. 527) has established the fact that large numbers of tsetse flies are carried on trains in Kenya, largely on the outside of waggons. They have been carried into stock-farming areas and may have been responsible for outbreaks of animal trypanosomiasis.

The tsetse fly situation in Southern Rhodesia in 1946 is described by CHORLEY (p. 966). HORNBY (p. 20) has contributed a series of papers on tsetse flies and vegetation in parts of Portuguese East Africa.

From Mozambique (p. 217) comes a long account of the antitrypanosomiasis campaign, which includes a series of papers by HORNBY, and a paper by PIRES on types of vegetation and species of tsetse flies.

VANDERPLANK (p. 820) has studied the flying movements of *G. palpalis*.

Squire (p. 527) has analysed, according to age and sex, etc., a collection of *G. palpalis* made in Sierra Leone.

G. palpalis palpalis was the only tsetse fly found in Fernando Po by González Vicente (p. 1069).

Nash and Davey (p. 718) discuss the resting habits of *G. medicorum*, *G. fusca* and *G. longipalpis* in Nigeria.

Moggridge (p. 333) shows that *G. pallidipes* does not readily attack objects moving along the edge of vegetation forming its habitat. The influence of temperature and saturation deficiency on the activity of *G. pallidipes*, *G. austeni* and *G. brevipalpis* on the Kenya coast is discussed by the same author (p. 332).

Fairbairn and Culwick (p. 820) find a relationship between soil temperature, rainfall, and the prevalence of *G. swynnertoni*. Jackson (p. 17) gives an account of the eclosion of the larva of *G. swynnertoni*.

Clinical Findings

In Portuguese Guinea Ferreira and de Almeida (p. 967) have found trypanosomes in sternal marrow when blood, glands and cerebrospinal fluid were negative.

Gasq (pp. 447, 821) has examined various methods of estimating the protein content of the cerebrospinal fluid in sleeping sickness, and prefers the direct nephelometric method. He has also investigated the glucose content of the blood and cerebrospinal fluid, finding a tendency to hypoglycaemia in uninfected Africans, which is accentuated during infection. Ferreira (p. 1069) reports a systematic study of the cerebrospinal fluid in sleeping sickness in Portuguese Guinea.

Toulant (p. 1128) has written a monograph on the ocular manifestations of trypanosomiasis, both African and American.

Tooth (p. 1222) points out that trypanosomiasis is one of the commonest causes of mental derangement in the Gold Coast, and discusses this and other forms of mental illness in a monograph on the subject.

Treatment : Drug Prophylaxis

Ceccaldi *et al.* (p. 822) have tried a number of treatments with various drugs in Brazzaville. Lourie has set these out, with the results, in a comprehensive table.

Schnitzer and Kelly (p. 826) discuss antagonists of the trypanocidal action of certain arsenicals and acridines.

Rollo, Williamson and Lourie (p. 333) have made an experimental trial of melarsen and melarsen oxide, and of their antimonial analogues MSb and MSb3 respectively, in animals infected with an old laboratory strain of *T. rhodesiense*, which would now indicate the value of compounds in relation to *T. gambiense*. The pentavalent compounds melarsen and MSb were much more effective than tryparsamide, and the trivalent preparations melarsen oxide and MSb3 were more effective than mapharside or butarsen. In prophylaxis a single injection of MSb protected mice for as long as 41 weeks, whereas comparable doses of suramin and pentamidine protected for only 10 and 2 weeks respectively. Williamson (p. 334), in continuation of this work, found that MSb is excreted much more slowly than antimony administered as stibenyl, and that tissue levels with MSb are higher than with stibenyl, and are maintained much longer.

Ceccaldi *et al.* (p. 528) used melarsen oxide (3177 RP) in sleeping sickness [*T. gambiense*] ; in small doses it is satisfactory in the earliest stages, but if there are even slight changes in the cerebrospinal fluid it is not successful. It is not toxic in small doses, but in larger doses which might be effective against disease involving the nervous system its toxicity precludes its use.

The compound Melarsen-BAL (Mel B) has been prepared by Friedheim with the object of reducing the toxicity of the trivalent melarsen, and the antimony analogue is MSbB. Extensive trials by Mel B in French West Africa were made by Le Rouzic (p. 449) and Schneider *et al.* (p. 449). The results are given in tabular form by Lourie, who extracted the figures from the reports ; they indicate that Mel B is active and not very toxic, though more toxic than lomidine. Le Rouzic prefers lomidine in first-stage cases, but Schneider *et al.* think that Mel B should be used in these cases if there is any indication that infection has passed the meningeal barrier. For details the original full abstract should be consulted. Ceccaldi *et al.* (p. 824) agree that Mel B has a rapid trypanocidal action, but they think it far too toxic in the dosages recommended by Friedheim. Monnet and Lapeyssonnie (p. 1187) cured a patient suffering from arsenical encephalopathy due to treatment with Mel B, by injections of novocaine. They describe the reasons which led them to use novocaine, and they have tried in animals mixtures of the two substances, in various doses. The mixtures are active against trypanosomes and were well tolerated when given by intravenous administration, but were painful on subcutaneous injection.

It is well known that suramin combines with plasma proteins and other proteins, and this probably accounts for its long retention after injection. Wilson and Wormall (p. 120) discuss these combinations, but for details the original should be consulted. Town *et al.* (p. 1069) show that plasma proteins combine with 70–90 per cent. of injected suramin, and discuss the possible mechanism of action of this drug.

Ceccaldi *et al.* (p. 18) treated patients infected with *T. gambiense*, in the lymphatico-blood stage, with pentamidine given intravenously. The results were moderately good, but this route is no longer used, and intramuscular injections of larger amounts give better results. Ceccaldi and Arnoult (p. 19) successfully treated with intravenous pentamidine three patients whose *T. gambiense* infection had relapsed after treatment with either pentamidine or orsanine. Le Rouzic (p. 448) shows that pentamidine and lomidine produce good results in sleeping sickness if they are used in patients in whom there is no doubt that the cerebrospinal fluid is normal. The course of treatment is short, and the author advocates 5 intramuscular injections of 4 mgm. per kgm. at intervals of 48 hours. Gasq and Lapeyssonnie (p. 821) think that although most of the toxic reactions to pentamidine are due to its hypotensive effects, some may be due to the hypoglycaemia produced. Lalouel (p. 823), after a long follow-up period, quotes evidence to show that treatment with intravenous pentamidine, even in doses now regarded as inadequate, gave results which compared favourably with those obtained with atoxyl and orsanine. The intravenous route is not now favoured, but may be permissible in selected cases.

Brownlee *et al.* (p. 1070) have examined the chemotherapeutic action of a comprehensive series of phenanthridinium salts against *T. congolense* and *T. rhodesiense*, and some of the same workers have done so against *T. cruzi* (Goodwin *et al.*, p. 1071). Details of the findings should be sought in the original. The most promising drug in the *T. cruzi* series was tested in relation to its pharmacological properties by Goodwin *et al.* (p. 1072), because it seems worthy of clinical trial. This substance is carbidium ethanesulphonate, and the limits of toxicity in animals, and the pharmacological effects in man, are described.

Harding and Hutchinson (p. 824) found in Sierra Leone that mass prophylaxis with either pentamidine or suramin conferred very definite protection on a large number of people for a year. They favour pentamidine in a dose of 175 mgm. intramuscularly, to be repeated after one year. Mass prophylaxis campaigns should be preceded by careful diagnosis to discover and treat

existing cases. A favourable account of chemoprophylaxis by pentamidine in the Belgian Congo is given by SCAILLET and HADDAD (p. 453). An intramuscular injection of 5 mgm. per kgm. was given at first, but because this caused a few reactions in menstruating women, the dose was later given in two parts, 3 and 2 mgm., separated by an interval of 2 hours. There was no indication of reduced effectiveness. Six months later 14,533 people were re-examined and only 15 cases of trypanosomiasis were found, against the 200 which would have been expected. LAUNOY (pp. 21, 334) gives information on the protection afforded against *T. gambiense* to rats by oral administration of salts of pentamidine base. In man pentamidine and lomidine have been used by injection extensively in French West Africa, and the index of new infection has fallen from 1·0 to 0·05 per cent. in the same period. The dose of pentamidine for this purpose is 5 mgm. per kgm. intramuscularly.

In relation to chemoprophylaxis in French West Africa LE ROUZIC (p. 451) shows that in 1948 some 87,869 persons were given lomidine, and that 5–12 months later only 7 of 13,146 followed up were found infected, though in controls the indices of infection were 0·66–1·12 per cent. MSb was also used in 794 persons followed up for 4–8 months, and no cases of sleeping sickness were found. This tends, on a small scale, to confirm the results obtained in the laboratory by ROLLO *et al.* [above]. The author thinks that chemoprophylaxis will replace agronomic control in forest as well as savanna areas. Pentamidine and lomidine were used by KERNEVEZ and CHASSAIN (p. 825) in French Equatorial Africa for mass prophylaxis, in doses repeated at intervals of 6 months. The rapid decrease in infection rates was the result not only of this prophylaxis but also, no doubt, of the full treatment given to any persons found infected. The authors think that the risk of masking the infection is less with these drugs than with suramin.

Control

The report of the British African Land Utilization Conference held in Nigeria in 1949 (p. 1073) covers many subjects important in relation to tsetse flies and the problems of clearing.

MOGGRIDGE (p. 606) notes a very great reduction of *G. pallidipes*, *G. brevipalpis* and *G. austeni* in an experimental area on the Kenya coast in which discriminative clearing of close-growing thicket, climbers and woody growth was carried out, leaving shrubs and trees untouched.

In the Northern Territories of the Gold Coast a programme of selective clearing along rivers, streams and pools has been very successful against *G. palpalis* and *G. tachinoides*. MORRIS (pp. 19, 335) shows that the original clearing was done in 5 years and that maintenance involves only 10 man-days of labour per square mile every 3–5 years. According to VILAIN (p. 454) agronomic tsetse control is not particularly useful in forest and moist savanna areas, but is valuable in drier savanna, in French West Africa. These methods have been given up in Guinea, the Ivory Coast and Lower and Middle Casamance. Elsewhere the selective clearing of Morris is to be continued and extended. It is important to cultivate the cleared riverine areas, and resettlement may have to be considered. Chemoprophylaxis will be used to deal with any outbreaks in the well watered regions which are to be occupied.

An experiment with DDT smoke bombs along a stream which had been cleared of bushes, but not of trees, failed to show any effect in the reduction of numbers of *G. palpalis* caught in traps (VERHAEGHE, p. 455). Studies of the loss of DDT and BHC by absorption into mud and vegetation are reported by HADAWAY and BARLOW (p. 413), who used *G. palpalis* and *Aëdes aegypti* in their work.

ACRES (p. 1068) shows that sleeping sickness in a small district on the River Congo was controlled during 10 years solely by regular diagnostic examinations

and treatment of new cases and relapses with arsenicals. The type of disease was mild.

Trypanosomiasis of Animals

TENDEIRO (p. 719) discusses the trypanosomiases of animals in Portuguese Guinea.

GOBLE (p. 828) discusses the trypanocidal action of certain series of compounds of which Surfen C and Bayer 7602 Ac are members.

PACKCHANIAN (p. 720) has used American forest deer mice for experimental work with *T. brucei*.

PIEKARSKI (p. 21) induced drug-fastness to trypaflavine in *T. brucei* and observed loss of the blepharoplast in them. Sensitivity to the drug returned when it was discontinued, but the trypanosomes remained without the blepharoplast.

FIENNES (p. 827) discusses pathology and immunity in relationship to *T. congolense* and *T. vivax* infections of cattle.

CURD and DAVEY (p. 827) describe the work which led to the discovery of Antrycide. The chloride is only slightly soluble in water and is therefore slowly absorbed and useful in prophylaxis. The methylsulphate is freely soluble and is used for curative effect. An account of the prophylactic and curative effects of Antrycide in cattle infected with *T. congolense* and *T. vivax* is given by DAVEY (p. 968). In the conditions of the field experiment in East Africa he advises re-treatment at 8 or 12 weeks according to circumstances. The methylsulphate is not toxic in doses of 5 mgm. per kgm. if the animals are kept quiet after injection. The chloride is not toxic. Resistance to Antrycide appeared in some strains of *T. congolense*. SCHOENAERS (p. 969) has used Antrycide methylsulphate successfully in *T. congolense* and *T. vivax* infections.

DEOM (p. 969) has used dimidium bromide in prophylaxis against *T. congolense* and *T. vivax*, but the observation period was short.

The behaviour of *T. equiperdum* in various species of wild mice is discussed by WERNER (p. 720).

Various trypanosomes of man and animals in Colombia are discussed by RENJIFO-SALCEDO and others (p. 720).

AMERICAN TRYPANOSOMIASIS

CHAGAS'S DISEASE

Epidemiology: Transmission

DIAS (p. 217) discusses the incidence of Chagas's disease in Minas Gerais, where it is widely diffused and is a common cause of death. Accounts of Chagas's disease in Uruguay are given by TALICE (pp. 121, 122), who describes the clinical course of the disease. He points out that although BHC is effective against the bugs, a more important preventive measure would be the substitution of modern buildings for primitive rural dwellings.

DIAS (p. 123) and PELLEGRINO (p. 123) draw attention to the danger of transmission of Chagas's disease by blood transfusion.

PELLEGRINO and BORROTCHIN (p. 23) note 15 species of reduviid bugs which can transmit Chagas's disease in Minas Gerais, Brazil, but only 3 are important. They discuss the clinical features of the disease and conclude that it is one of the most important factors in heart disease in that country.

SULLIVAN *et al.* (p. 455) found infection with *T. cruzi* in one-third of a large number of triatomids caught in Texas. They remark, however, that no indigenous human cases of Chagas's disease have been reported in the United States.

Aetiology

Studies have been made of 4 strains of *T. cruzi* by VON BRAND *et al.* (p. 218), who found considerable differences in virulence, but not in cultural characters. They describe and discuss their findings.

HAUSCHKA *et al.* (p. 607) have demonstrated the immunological interrelationship between 7 strains of *T. cruzi*, but have found it impossible to produce passive immunization or immunization with killed antigens. Normal human sera possess non-specific agglutinins to most strains, and this test is therefore not useful in diagnosis, though one strain is refractory to these agglutinins but susceptible to specific agglutinins in Chagas's disease, and may therefore be useful in a diagnostic test.

Irradiation of cultures of *T. cruzi* by X-rays does not easily affect their infectivity (EMMETT, p. 608), and it seems unlikely that treatment of Chagas's disease with radioactive substances would be valuable.

PIZZI *et al.* (p. 455) show that certain strains of mice are highly susceptible to *T. cruzi*, and others highly resistant. These qualities are related to genetic constitution.

T. cruzi has been found for the first time in a rat in Mexico City (BELTRÁN and PÉREZ, p. 609).

Clinical Findings : Treatment, etc.

Injections of sodium iodide intravenously may reverse a positive Machado-Guerreiro reaction, and MARTINS (p. 609) suggests that the drug may be effective in treatment.

The post-mortem appearances in a case of Chagas's disease are reported by TORRES and DUARTE (p. 336), who found myocarditis and describe the morphology of *T. cruzi* in the heart muscle. PAPROCKI (p. 722) found *T. cruzi* in the heart valves of only 3 of 14 dogs which died in the acute stage of experimental Chagas's disease. In 30 cases of chronic Chagas's disease DE MENEZES (p. 336) found right bundle-branch block in 15 and complete A-V block in 3. In Venezuela BENAIM PINTO and DRAYER BRITO (p. 721) examined 42 patients who had myocarditis, and found that 21 were positive for Chagas's disease by xenodiagnosis ; they argue that even positive xenodiagnosis does not prove that the myocarditis is due to that infection, since syphilis and other conditions can cause it.

LARANJA *et al.* (p. 22) discuss the symptoms of Chagas's disease, especially the acute cardiac condition which sometimes develops. They mention treatment with the drug known as 7602 (Ac) Bayer, but the best is the arsenobenzol sulphate 9736 (As) Bayer. Penicillin has given conflicting results. Aureomycin is of no value in experimental *T. cruzi* infection (JARPA *et al.*, p. 456).

NEGHME *et al.* (p. 722) have tested " Compound 497 " ($C_{12}H_8OCl_6$) against *Triatoma infestans*, and find it useful, though rather slower than BHC.

In a paper on the use of inoculation of *T. cruzi* in the treatment of malignant disease, GALLIARD *et al.* (p. 888) give a detailed account of the parasitology, clinical features and course of the infection.

OTHER TRYPANOSOMIASES

FLOCH and ABONNENC (p. 219) show that *T. conorrhini* in Triatomid bugs may be mistaken for *T. cruzi* but that they can be distinguished morphologically. *T. conorrhini* is probably a rat trypanosome.

FLOCH and ABONNENC (p. 121) discuss the identity and pathogenicity of *T. rangeli*. Human infection with *T. rangeli* has been proved in Venezuela, and PIFANO *et al.* (p. 723) report 41 cases in which xenodiagnosis was positive. The pathogenicity of the organism is still uncertain because it has so often been

confused with *T. cruzi*. HERNANDEZ-DE-PAREDES and PAREDES-MANRIQUE (p. 724) describe a human case of *T. rangeli* infection in Colombia. PIFANO and MAYER (p. 609) discuss the forms of *T. rangeli* found in *Rhodnius prolixus*.

Charles Wilcocks

MALARIA

PAYET, M. Paludisme du nourrisson et de l'enfant avant l'âge scolaire. [**Malaria of Infants and of Children below School-Age.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 517–20.

In an infant welfare centre at Anosy on the high plateaux of Madagascar, 350 infants below the age of 5 years have been under observation since 1945. All these infants receive a weekly dose of quinacrine [mepacrine], 5 to 10 cgm. in watery solution. In spite of this medication 92 per cent. of the children aged 4 to 5 have enlarged spleens. The spleen rates of the various age groups were : 0–1, 16 per cent. ; 1–2, 36 ; 2–3, 60 ; 3–4, 63 ; 4–5, 92 per cent. After 5 years of age the rate fell to 57 per cent.

In a second group of 100 infants of the same ages attending the Anosy hospital, who had not received any suppressive medication, the maximum spleen rate occurred earlier, between 1 and 2 years of age, 84·35 per cent. as compared with 36 in infants of this age attending the welfare centre. After the 5th year children who had had no suppressive medication had a spleen rate of 74 as compared with 57 in the treated group. Existing methods of quinacrine distribution are very imperfect but not worthless.

In some countries with hyperendemic malaria the large spleens of childhood tend to decrease in volume with increasing age and the acquisition of premunition. Not so on the high plateaux of Madagascar. The vast majority of all patients admitted to hospitals have enlarged spleens. *Norman White*

ANDREWS, J. M., QUINBY, G. E. & LANGMUIR, A. D. **Malaria Eradication in the United States.** *Amer. J. Pub. Health.* 1950, Nov., v. 40, No. 11, 1405–11, 3 figs. [20 refs.]

Malaria is a gradually declining disease in the United States, but it was believed to be present in many regions in the 13 traditionally malarious States of the south-east. In 1945 the residual DDT spraying of houses, to the exclusion of all other methods of malaria control, was started in selected civilian areas. By 1947 a comprehensive project was under way having as its object the eradication of endemic malaria within five years. In 1945 a total of 62,763 cases of malaria were reported in the U.S.A., 78 per cent. of which occurred in the 13 south-eastern States. By 1949 the total had dropped to 4,241. These figures have doubtful significance because it was found during the course of the studies here reported that malaria morbidity statistics in the past have been grossly misleading.

In 1947 the Communicable Disease Centre began a programme of malaria appraisal : medical and nurse epidemiologists were attached to States to appraise individual cases and deaths attributed to malaria, to investigate reported outbreaks of the disease and to promote better diagnosis and treatment. During 1949 4,012 cases of malaria were reported in the 13 States. Of these only 494 were " appraised cases ". Parasites were found in only 55 of these by a State-approved laboratory. All but 19 of these 55 were found to be either relapses, imported cases or the result of transfusion. These 19 cases, which have been classified as indigenous primary malaria, were all sporadic without clear relation to another case. Reliable cases of primary malaria are indeed so few that the

occurrence of consecutive transmission is debatable. "A careful review of reported malaria mortality and morbidity, of diagnostic and survey blood examinations, and of case appraisals, all support the contention that endemic malaria has been reduced to the vanishing point. But these data are not considered sufficiently extensive to prove that malaria has been eradicated from this country." *Norman White*

DE MIRANDA, S. Indices de variação estacional de malária no Estado de São Paulo e no período 1940–1946. [**Seasonal Variations Index of Malaria in the State of São Paulo from 1940 to 1946.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 119–28, 5 diagrams. English summary.

This is a study of malaria morbidity and mortality returns from all parts of the State of São Paulo and the monthly incidence of cases and deaths is graphically represented. The malaria year extends from October to September (October is an early spring month). Some 80 per cent. of cases are *P. vivax* infections, the remainder *P. falciparum.* There is a small rise in *P. vivax* incidence in October : this is believed to consist almost entirely of relapses with few if any delayed primary attacks. The main summer *P. vivax* wave reaches its height in March. The *P. falciparum* incidence curve has but a single wave, reaching its height in May. *Norman White*

DE MELLO, V. H. Epidemiologia da malária na região de Sorocaba, Estado de São Paulo (Brasil). [**Epidemiology of Malaria in the District of Sorocaba, State of São Paulo (Brazil).**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 159–75, 4 graphs & 1 map. English summary. [12 refs.]

Sorocaba is a large area in the south-east of the State of São Paulo which comprises 36 " municipios " with a population of 550,000 and an area of 32,000 square kilometres. The epidemiology of malaria differs in different parts of the area. The west part of the area which lies along the River Tiete and contains the municipios of Sorocaba, Tiete and Porto Feliz, has a low degree of endemicity but epidemic outbreaks may occur. In the east of the area which lies along the River Paranapanema, severe epidemic outbreaks are more common but they are separated by years with negligible malaria incidence. *A. darlingi* is the main vector throughout the area. Usually *P. vivax* is responsible for about two-thirds of the infections but exceptionally *P. falciparum* may predominate. The marked irregularity which characterizes malarial incidence in the Sorocaba area from year to year complicates the task of assessing the results of anti-malarial measures of any kind. *Norman White*

PASSALACQUA, C. de Sá P. Notas sobre a epidemiologia da malária na região de Presidente Epitácio (Zona Limítrofe dos Estados de São Paulo e Mato Grosso). [**Notes on the Epidemiology of Malaria in the President Epitácio Region (Boundary between the States of São Paulo and Mato Grosso).**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 193–203, 2 maps. English summary.

ASCOLI, M. & D'ALESSANDRO, G. **Some Remarks on the Life Cycle of the Malaria Parasite in the Human Host.** *Acta Tropica.* Basle. 1950, v. 7, No. 4, 367–71. [20 refs.]

After a brief account of the discovery of exoerythrocytic stages of malaria parasites in man and lower animals, the authors discuss the prevailing view that

these stages are responsible for clinical relapses of the disease. They doubt the correctness of this view but believe that after parasitaemia subsides the erythrocytic parasites continue their development in the vessels of some internal organs, especially the spleen, whence they may emerge to invade the peripheral circulation and produce relapses. They have found that, in the case of *Plasmodium gallinaceum*, parasitaemia is succeeded by a latent phase, during which erythrocytic forms are not in evidence in the peripheral blood, whereas EE forms are at first abundant but later disappear. Erythrocytic forms can then be found in the spleen, which is the main focus of the latent infection. The parasites in this organ are said to be " sheltered from the injury of drugs and antibodies " and provide the source from which the peripheral circulation is re-invaded. The authors maintain that the same conditions obtain in human malaria, where " Evidences given by physiology, pathology and clinical observation brought to light the existence of a focal phase of the malaria infection ". In support of these views they mention the provocation of relapses by intravenous administration of 1/40 mgm. adrenaline. The resulting passage of parasites into the peripheral circulation is adduced as evidence of the presence of erythrocytic forms in the spleen. As regards the argument that relapses are absent in human malaria induced by blood-inoculation, the authors point out that relapses do occur in fowl malaria (*P. gallinaceum*) and that in blood-induced simian malaria (*P. cynomolgi*) relapses can be provoked by splenectomy. In short, they think that the discovery of the EE phase of development merely served to fill a gap in our knowledge of the life cycle of *Plasmodium*. As regards the blood phase, " after its maturation through the pre-erythrocytic cycle the parasite begins its endo-erythrocytic life which goes on without interruption, even during an apparent latency." *C. A. Hoare*

SCHUBERT, J. H. & KELLEY, Mary J. **The Precipitin Technique for determining Species of Host Blood in Mosquitoes—Modification and Improvements.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 341–8, 5 figs.

" Although the precipitin test itself is a relatively simple procedure, many problems have developed when carried out on 20,000 mosquitoes annually. The illustrations and descriptive data are presented here to help others who find it necessary to do similar testing. The importance of preparing high-titer, specific antisera cannot be over emphasized. In addition to the sera, the capillary test tubes, in which the precipitin test is carried out, are of great importance. These must be chemically clean and dry at the time of setting up the tests.

" As in other serological tests, good results are largely dependent upon the specimen. Unsatisfactory results are obtained if complete digestion of the blood meal has occurred. Best results were obtained with fully engorged mosquitoes collected within 17 hours after feeding."

JETTMAR, H. M. Über die Resistenz der aquatischen Entwicklungsformen der Stechmücken gegen Trocknung. [**The Resistance of the Aquatic Stages of Mosquitoes to Desiccation.**] *Arch. f. Hyg. u. Bakt.* 1951, v. 134, No. 1, 11–26, 8 figs. [20 refs.]

Flooded rice fields create an " anopheline paradise " and present a serious problem in mosquito control in Asia and in Southern Europe. It has been suggested that draining the fields, from time to time, would reduce the numbers of mosquito larvae, but the efficacy of this has been disputed.

The author has investigated the ability of larvae and pupae of *Culex pipiens* and *Anopheles maculipennis* to recover after exposure to air on filter paper or mud.

It was found that in general pupae were more resistant than fourth stage larvae and the latter more resistant than second stage larvae. All stages of *C. pipiens* seemed more resistant than the corresponding stages of *A. maculipennis*. In many cases, although surviving, larvae appeared to be unable to pupate, and pupae to emerge successfully, after some days' exposure. These results were obtained from exposures on filter paper and on wooden boards.

When mud was used as a substratum, similar results were obtained. It was also found that larvae and pupae survived better at 8°C. and a high humidity than at temperatures of 22–24°C. and lower humidities. The properties of the mud were of some importance, in particular its capacity to retain water and its water content during the experiments.

In rice fields in China, the author found that as well as the effects of drying and of exposure to the sun's rays, stranded larvae were attacked by a *Saprolegnia*-like fungus and by swarms of ants. The author concludes that intermittent drainage of rice fields is a valuable method of mosquito control, particularly in undulating country. *J. H. Sudd*

GAUD, J., MECHALI, D. & DELRIEU, J. Riziculture et paludisme au Maroc. [**Rice Cultivation and Malaria in Morocco.**] *Bull. Inst. Hyg. Maroc.* 1949, v. 9, Nos. 3/4, 181–90, 3 figs.

Since 1937 the Antimalaria Service of Morocco has persistently opposed the introduction of rice cultivation in Morocco. Rice-fields afford particularly favourable conditions for the breeding of the local malaria vector, *Anopheles maculipennis sicaulti*. The discovery of new contact insecticides such as DDT and BHC, and the development of airplane dusting with such products, render possible the control of mosquito breeding in rice-fields. In 1949 rice cultivation was undertaken in two areas in the Gharb. The authors describe the results. Ample confirmation was obtained of the partiality of the vector species for rice-fields for breeding. In both places severe outbreaks of malaria occurred, localized to an area extending 2 kilometres around the irrigated fields. In one place this was due to a delay of 13 days in airplane dusting ; in the other it was due to insufficient larval control during a critical month. Rice cultivation is, however, of very great importance to the economy of Morocco. If it is to be encouraged rigid control measures must be imposed. It should only be allowed far away from important centres of population. The concentration of rice cultivation in specified areas and the grouping of rice growers into syndicates would facilitate malaria control measures and fair distribution of the costs. Residual spraying of houses within 3 kilometres of the rice-fields might afford adequate protection, even in the absence of antilarval measures. *Norman White*

HUTTEL, V. Note sur la répartition des moustiques dans le Bas-Dahomey. [**A Note on the Distribution of Mosquitoes in Lower Dahomey.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 563–6.

SUBRAMANIAN, R. & SEN GUPTA, R. K. **Malaria Transmission in Former Udaipur State, Central Provinces.** *Indian J. Malariology.* 1950, Mar., v. 4, No. 1, 91–6, 1 map & 1 graph.

The authors re-examined the mosquito fauna and malaria vectors of Udaipur State, now merged with Central Province and Berar, since earlier observations by ROY and BISWAS [this *Bulletin*, 1943, v. 40, 112] were not confirmed by subsequent reports from adjacent areas by Senior WHITE [*ibid.*, 1944, v. 41, 721].

The present authors record the following anopheline species taken in the seven months since the beginning of their work in June, 1949 : *A. culicifacies, A. fluviatilis, A. minimus, A. jeyporiensis, A. stephensi, A. pallidus, A. splendidus, A. subpictus, A. barbirostris, A. karwari, A. vagus, A. hyrcanus, A. annularis, A. tessellatus, A. jamesi, A. theobaldi, A. maculatus.*

A. culicifacies declined in numbers from July to November while *A. pallidus* and *A. fluviatilis* increased during this same period. The only species positive for sporozoites were *A. culicifacies* (0·08 per cent. of 2,277 dissected) and *A. fluviatilis* (0·7 per cent. of 1,335 dissected) ; 7,121 *A. pallidus* and several hundreds of some of the other species were dissected but none was positive for sporozoites.

It is concluded, since *A. fluviatilis* was found positive from September to December, that it is the principal vector of malaria and that *A. culicifacies*, positive only in June, plays only a small part in transmission. Contrary to the report of Roy and Biswas, *A. pallidus* was not found infected. The present authors confirm the observations of Senior White. *D. S. Bertram*

McArthur, J. **Malaria and its Vectors in Borneo. A Study of Borneo's Greatest Disease Problem, and of the Mosquitoes Responsible for its Transmission, throughout North Borneo and Labuan, Sarawak, Brunei and Dutch Borneo, to the End of the First Half of the Twentieth Century.** *Indian J. Malariology.* 1950, Mar., v. 4, No. 1, 1–90, 2 charts & 5 maps. [Numerous refs.]

The author gives an account of his researches into malaria and its vectors throughout the whole island of Borneo. From past records and personal observations it is concluded that, excluding the main towns and industrial centres, the whole country is intensely malarious.

Identification records of malaria parasites are found to be not very reliable, but *Plasmodium falciparum* appears to be usually predominant, *P. vivax* often so and *P. malariae* predominates in some localities.

About 40 observers have recognized 42 species or sub-species of *Anopheles* ; 16 of these have been dissected ; 9 have been recorded as infected but only 4 (*A. leucosphyrus, A. umbrosus, A. sundaicus* and *A. baezai*) have been recorded with sporozoites. The majority of the positive records, and the highest infection rates, concern *A. leucosphyrus*, the most widely distributed species of *Anopheles* in Borneo. Species needing study are *A. separatus, A. hyrcanus, A. barbirostris, A. tessellatus* and *A. minimus* var. *flavirostris*. *A. maculatus* is of little importance. All the data forming the basis of this paper are presented in five appendices occupying 60 pages. *H. S. Leeson*

Rachou, R. G. & Gaberlini, J., Jr. Comprovação do *Anopheles* (*Nyssorhynchus*) *darlingi* Root, 1926 como vetor de malária no Norte do Paraná. [**Evidence of *Anopheles darlingi* as a Vector of Malaria in the North of Parana, Brazil.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, July, v. 2, No. 3, 272–7. [22 refs.] English summary (6 lines).

The authors record for the first time the finding of *Anopheles darlingi* naturally infected with the *Plasmodium* of malaria in the State of Paraná, Brazil, at Marques dos Reis Jacarézinho on the Rio Paranapanema.

The observations were made between January and April 1950, when 1,924 specimens were collected, of which 273 were dissected. Out of 121 stomachs examined 1 was positive, giving an oöcyst rate of 0·8 per cent. Out of 261 salivary glands examined 1 was positive giving a sporozoite index of 0·4 per cent. The data are listed from all previous references to the natural infection of *A. darlingi* in Brazil. *H. S. Leeson*

DE LUCENA, D. T. Habitos domiciliares do *Anopheles tarsimaculatus* Goeldi, 1905. [**House-Frequenting Habits of** *Anopheles tarsimaculatus*.] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1950, July, v. 2, No. 3, 239–60, 7 graphs. English summary.

These studies on the house frequenting habits of *Anopheles tarsimaculatus* (=*aquasalis*) were made in two places in the State of Pernambuco, Brazil, in 1948. Data are shown in 5 tables and 7 graphs.

Of the 5,131 anopheline mosquitoes of 4 species caught in houses during the year in Russinha the species *A. tarsimaculatus* formed over 99 per cent. At Pontesinha, 13,820 anophelines were taken during the same period but besides *A. tarsimaculatus* only one other species (*A. albitarsis*) was recorded and this formed over 32 per cent. of the collection.

The prevalence of *A. tarsimaculatus* in houses is shown to be related to rainfall; for after the rains started in April the numbers increased rapidly until June, after which the amount of rainfall and the numbers of anophelines in houses gradually decreased. In August when the rainfall was again low the density of *A. albitarsis* in houses at Pontesinha was greater than that of *A. tarsimaculatus*.

A. tarsimaculatus enters and rests in houses after daylight and is associated with malaria epidemics in this part of Brazil but owing to the application of residual DDT this mosquito is becoming rare in some places. *H. S. Leeson*

CORRÊA, R. R. Alguns informes sôbre *Anopheles* (*Arribalzagia*) *intermedius* (Chagas, 1908). (Diptera, Culicidae). [**Notes on** *Anopheles* (*Arribalzagia*) *intermedius*.] *Arquivos de Hig. e Saúde Pública*. S. Paulo. 1949, v. 14, Nos. 39, 40, 41 & 42, 79–89, 1 chart & 1 map. [12 refs.]

The English summary appended to the paper is as follows :—

"Some investivations were carried out for studying *Anopheles* (*Arribalzagia*) *intermedius*, Chagas 1908, in the State of São Paulo, Brazil. The Adult specimens of the species were rarely found indoors, they were more easily caught in stables and with animal bait (horse).

"This species could not be incriminated as a good vector of malaria, in spite of being very abundant on the lowlands, chiefly near the Atlantic coast (see sketch map). It does not occur on the "plateau".

"*A. intermedius* prefers to breed in ditches and pools, although it can be found in breeding places of other kinds.

"Keys for larvae and adults of the species of the subgenus of *Anopheles Arribalzagia* and *Shannonesia* are here given."

CORRÊA, R. R. Os anofelinos da região de Sorocaba. (Diptera, Culicidae.) [**The Anophelines of the Sorocaba Region.**] *Arquivos de Hig. e Saúde Pública*. São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 177–91, 1 map. English summary (9 lines).

CORRÊA, R. R. Descrição de *Anopheles* (*Kerteszia*) *montemor* nova espécie de anofelino do Brasil (Diptera, Culicidae). [**Description of** *Anopheles* (*Kerteszia*) *montemor* **a New Species of Anopheline in Brazil.**] *Arquivos de Hig. e Saúde Pública*. S. Paulo. 1949, v. 14, Nos. 39, 40, 41 & 42, 53–5, 2 figs. on pl. English summary (2 lines).

DONALDSON, A. W. & BROOKE, M. M. **Effects of Various Modifications of a Mass Staining Procedure on the Transfer of Malarial Parasites between Blood Films.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 239–47.

In a previous paper [this *Bulletin*, 1948, v. 45, 1056] the authors have shown that, when a mass staining method is used for blood films, elements from one slide (including malaria parasites) can be transferred to another slide, with the result that false positive diagnosis of malaria is made. They now describe the results of a study in which this question was investigated experimentally, with the view to eliminating the source of error without abandoning the otherwise valuable technique. For this purpose, thick blood films were made from pigeon's blood, from human blood containing malaria parasites, and from normal human blood. The slides were arranged in packets of 25 slides each, according to the Barber-Komp technique [this *Bulletin*, 1925, v. 22, 405]. In a packet, the avian or parasitized slides alternated with the normal human ones in such a way that the films were either opposing (or facing each other) or non-opposing (all facing in the same direction). They were stained for 45 minutes in containers with 1 : 50 dilution of Giemsa's stain.

Tests were first made on the results of agitating the staining solution. From previous experiments it appeared that the agitation caused by pouring out the Giemsa solution from the container favoured the transfer of avian red cells and of parasitized cells to slides with normal blood. When this method was compared with the effect of lifting the slide-packets out of the containers, it was found that the transfer was considerably reduced but not eliminated. Another source of transfer was provided by detached blood elements floating to the surface of the staining solution and being deposited on the films, especially along the stain line. This method of transfer was considerably reduced (but not eliminated) by flushing the staining solution from the container. The transfer of foreign elements occurring between packets of slides was also reduced by staining each packet separately and not in pairs. Finally, experiments were made with a surface active agent, with the use of "Triton X-30", a 33 per cent. aqueous solution of an alkalated aryl-poly-ether alcohol, which is soluble in cold water and miscible with alcohol and glycerin, and does not affect the staining action of Giemsa's solution. The addition of 0·5 per cent. "Triton X-30" proved to have the desired effect, for, irrespective of whether the stain was poured out of the container, or the slides lifted out of it, no evidence of transfer of parasites to normal blood films could be detected. It is thought that this treatment promotes the sinking of those detached blood elements and parasites which had risen to the surface of the Giemsa solution. [For a preliminary report see this *Bulletin*, 1950, v. 47, 518]. *C. A. Hoare*

DANA, R., CORCOS, A. & CORCOS, V. Gravité de la poussée épidémique actuelle de paludisme en Tunisie. [**Gravity of the Present Epidemic Outbreak of Malaria in Tunisia.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 416–18.

As examples of the severity of malaria attacks observed in Tunisia during 1949 condensed clinical notes are given of eight cases admitted to a single hospital during the course of that year. Four of these patients died within 24 hours of admission : three of them had *P. falciparum* and one a *P. vivax* infection. The *P. vivax* infection was that of a youth 18 years of age who had had fever for 11 days. Almost every red cell was parasitized, and anaemia was extreme. The four patients who recovered were all infected with *P. falciparum* ; they presented a variety of grave symptoms, a meningeal form, jaundice, anaemia and delirium in the absence of fever, and a pseudo-nephritic form with generalized oedema. Delays in diagnoses were largely responsible

for the high prevalence of pernicious attacks. The degree of parasite infestation was abnormally high. In such circumstances quinine injections are justified without waiting for confirmation of diagnosis. Doses of 1 gm. a day are generally sufficient : occasionally 1·5 gm. may be required.

Norman White

SCHWARTZ, R., MANSUY, M. M. & JOHN, W. C. **Current Concepts of Malaria with a Review of Five Hundred and Ten Admissions to a Veterans Hospital.** *Arch. Intern. Med.* 1950, Dec., v. 86, No. 6, 837–56, 8 figs. [Refs. in footnotes.]

The authors preface their paper with a concise account of the importance of malaria as a world problem and of present knowledge regarding the nature of the disease and its treatment and prevention. During six years 1944 to 1949 inclusive, there were 728 admissions to the Veterans Hospital, Aspinwall, Pa, in which a diagnosis of malaria was made. In 510 of these the diagnosis was confirmed by blood examination. The last case seen in this hospital was admitted in November 1948. In two cases *P. malariae* was found : the others were all *P. vivax* infections. A detailed study was made of the clinical notes of all these patients, the results of which are produced at length. The facts recorded are in no way unusual. *Norman White*

VAN DER KUYP, E. **Malarial Nephritis in Surinam, 1930–1940.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Dec., v. 2, No. 4, 363–73, 1 map.

With a desire to determine the rôle of malaria in the causation of nephritis, the author made a study of 35,386 case histories of patients admitted into Government hospitals in Paramaribo, Surinam. Similar studies on a smaller scale were made elsewhere in the colony. The results are set out in considerable detail. In Paramaribo, of 147 patients with *P. malariae* infections, 46 per cent. had nephritis, 78 per cent. had albuminuria. Mild quartan fever is a neglected disease in Surinam and the majority of patients in the Paramaribo hospitals had long-standing infections. In the Marienburg Sugar Estate Hospital only 1·7 per cent. of patients with *P. malariae* infections had nephritis. The Sugar Estate population is under close medical supervision and long-standing infections were very uncommon. Early treatment of *P. malariae* infection prevents renal complications. *P. falciparum* plays a very minor part in the production of nephropathies in Surinam, and *P. vivax* no part at all. All three infections cause a high incidence of albuminuria. *Norman White*

CORRADETTI, A. & VEROLINI, F. **Studies on Relapses in Blood-Induced Infections from *Plasmodium malariae* and *Plasmodium cynomolgi*.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 327–31.

Studies were made on eight human cases of *Plasmodium malariae* malaria and on 21 infections in rhesus monkeys of *P. cynomolgi*, to observe the nature of the relapse phenomenon following blood inoculation of these parasites. Both parasites had previously been through numerous blood passages. In the quartan malaria cases, parasitic relapses were observed from 2 to 29 weeks after the end of the primary attack. *P. cynomolgi* produced a primary attack lasting from 10 to 59 days, which was followed by relapses (in all the more fatal cases) occurring at any time during the next 28 weeks, but particularly at the 2nd–4th week, at the 15th–16th and at the 27th–28th week. Biopsies of the livers of these monkeys showed no exo-erythrocytic forms. The authors

conclude that their observations support Bignami's original theory of relapses rather than the exo-erythrocytic one. The former is based on the assumption that parasites persist in sub-patent numbers in the blood throughout and that when immunity diminishes, the parasites are able to proliferate and a relapse ensues. The exo-erythrocytic theory assumes that persistent tissue forms are only produced in mammalian malaria after sporozoite inoculation, and that relapses will never be found after blood inoculation.

[It is unfortunate that the authors do not define "relapse". If this term is confined to attacks of fever (or bouts of parasitaemia) following a primary attack, with parasite-free intervals between them, then there is no certainty that the attacks described in this paper belong to this category—they may well be recrudescences, or attacks of fever separated by periods during which the blood is never free of parasites (though these may only be detectable by massive blood inoculations into susceptible hosts). If this strict interpretation were applied, it may well be that relapses are due to persistent exo-erythrocytic forms while recrudescences are due to a persistent low parasitaemia with periodic fading immunity.] *P. C. C. Garnham*

Casile, M. Un nouveau cas de tétanos après injections de quinine observé à Cayenne. [**A New Case of Tetanus after Quinine Injections seen at Cayenne.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 662-6. [21 refs.]

A woman aged 21 died of tetanus in 26 hours about 14 days after the first of a series of four daily intramuscular injections of 0·4 gm. of quinine hydrochloride. These had been ordered by a doctor and given by a *sage-femme diplômée* with proper aseptic and antiseptic precautions. There was no local reaction or inflammation. The author quotes three similar cases in young women and remarks on the well-recognized virulence of *Cl. tetani* in Cayenne. He refers to Vincent's experiments in 1904 in which it was claimed that quinine activated tetanus spores injected into guineapigs, and believes that human carriers may react in the same way. He applauds the wisdom of the National Academy of Medicine which, in 1949, laid down that all people going to reside in malarious districts should be given anti-tetanic inoculation in order to guard against this complication. He goes further in suggesting that the practice of intramuscular injection of quinine should be discontinued but that if it has to be used then it should be accompanied by an injection of tetanus toxoid. [No reference is made to tests of sterility of the ampoules used which were said not to have been of local manufacture.] *C. C. Chesterman*

Indian Research Fund Association. Rep. Scient. Advisory Board for Year 1949, 13–32. **Malaria.**

Enquiries by the Malaria Institute of India during 1949 were chiefly into the efficacy of insecticides and their formulations. On the whole DDT seemed superior to benzene hexachloride ; a dose of 50 mgm. DDT per sq. ft. gave a more prolonged reduction in anopheline counts than 15 mgm. or even 30 mgm. of the gamma isomer of benzene hexachloride.

Dr. R. N. Chaudhuri of the Calcutta School of Tropical Medicine carried out several comparative trials of antimalarial drugs. In one the object was to test forms of mass treatment suitable for rural areas, with the use of a single dose of drug only. Treatments were given to 75 patients showing 36 *P. falciparum*, 35 *P. vivax*, 2 mixed (*falciparum* and *vivax*) and 2 *P. malariae* infections. The results may be summarized as :—

Drug	Proguanil	Chloroquine	Camoquin
Dose	0·5 gm.	0·5 gm.	0·5 gm.
Clinical cure	100%	100%	100%
Parasitic cure (3 days) ...	80%	100%	100%
Apyrexia (3 days)	84%	100%	100%
Relapses or recrudescences :			
(*a*) parasitic	12% (3 *vivax*)	8% (2 *vivax*)	12% (2 *falciparum*, 1 *vivax*)
(*b*) clinical...	24%	—	8%

There is an interesting note on a case of *P. falciparum* malaria resistant to proguanil. A boy with this infection was given 0·6 gm. on the first day of treatment and 0·3 gm. daily for the next 8 days without effect on fever or parasites. Four days later another four-day course (totalling 1·5 gm. proguanil) was given without effect. Blood and urine gave a strong reaction for proguanil. He then responded immediately to a single dose of 0·5 gm. chloroquine. A volunteer was subinoculated from the original case ; three days after inoculation he received 0·3 gm. proguanil daily for four days. Nevertheless, he developed a *falciparum* infection 17 days after inoculation. [This could have no bearing on the prophylactic value of proguanil as subinoculation does not involve the formation of the pre-erythrocytic form.] Proguanil 0·6 gm. daily for eight days had no effect on the infection though blood and urine gave a strong reaction for proguanil. A second volunteer was then inoculated and developed malaria 15 days later ; he responded to proguanil 0·4 gm. daily after 5 days of treatment, which was continued for 10 days. The infection in the first volunteer responded to chloroquine, though not so rapidly as in the original case.

Field tests of four prophylactic regimes in a Bengal village indicated that proguanil, 0·1 gm. twice weekly, was about as effective as chloroquine 0·25 gm. or camoquin 0·2 gm. once weekly, while proguanil 0·3 gm. once weekly was inferior. The tests are being continued and later results are said to be somewhat different from those recorded.

Work on the development and testing of antimalarials is in progress at the Haffkine Institute, Bombay, but progress has been delayed by technical difficulties. *G. Macdonald*

Cooper, W. C., Coatney, G. R., Jeffery, G. M. & Imboden, C. A., Jr. **Studies in Human Malaria. XXVIII. Observations on the Use of Chlorguanide against the Chesson Strain of** *Plasmodium vivax*. *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 366–76, 2 figs. [12 refs.]

This study was undertaken with 4 objects in view : (i) to determine a minimum suppressive dosage of chlorguanide [proguanil] and to ascertain whether this is influenced by the dosage of sporozoites, (ii) to determine whether increased suppressive doses in sporozoite-induced infections will result in drug resistance through action against fixed tissue parasites, (iii) to attempt the cure of *P. vivax* malaria by repeated massive doses of chlorguanide, and (iv) to assess the effect of administering chlorguanide and sulphadiazine concurrently. The subjects of the investigations were volunteers at the Federal Correctional Institution, Seagoville, Texas, who were infected with the Chesson strain of *Plasmodium vivax* by the bites of insectary-reared *Anopheles quadrimaculatus*, fed 2 weeks earlier on suitable gametocyte carriers. The volunteers remained

under close observation for 18 months. The following conclusions were arrived at :

(i) Sporozoite-induced *vivax* malaria, whether produced by the bites of 3 or of 30 heavily infected mosquitoes, was successfully suppressed for 1 year by doses of 200, 100 or 50 mgm. chlorguanide hydrochloride once weekly. Overt malarial attacks occurred in 17 out of 18 subjects after cessation of suppression. The erythrocytic parasites of these delayed attacks were susceptible to single 100 mgm. doses of chlorguanide.

(ii) Administration of progressively increased doses of chlorguanide, starting on the day of infection with 1·5 mgm. daily for a week and ending with 800 mgm. daily during the 10th week after infection, did not result in drug resistance in the parasites which appeared after cessation of suppression. It was concluded that the erythrocytic forms of *P. vivax* alone have the potentiality for ready acquisition of chlorguanide resistance.

(iii) The failure of large doses of chlorguanide to cure *P. vivax* malaria was confirmed, even when patients were treated with one gramme per day for 14 days. Chlorguanide proved slightly inferior to chloroquine in respect of both rapidity of action and in the total number of attacks per man.

(iv) No significant degree of synergism, either in suppressive or therapeutic action, was observed when chlorguanide and sulphadiazine were given concurrently.

G. Covell

CANET, J. Traitement de l'accès palustre aigu par une dose unique de nivaquine. [**Treatment of the Malaria Attack with a Single Dose of Nivaquine.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 538–44.

Sixty rubber plantation workers, aged 18 to 55, of Tonking origin, who had been resident a long time in a hyperendemic malarial region, had attacks of malaria which were treated each with a single dose of 1·2 gm. nivaquine. None were primary attacks ; most of the patients had enlarged spleens. They were all treated in hospital for five days and kept under observation for three weeks. Fifty of the patients had *P. falciparum* infections, 10 *P. vivax*. The average duration of fever after receiving the drug was 1·2 days for the *falciparum* cases, 1 day for the *vivax* cases. The average duration of parasitaemia after treatment was 1·6 and 1·3 days respectively. Relapses following this treatment were no more numerous than those after the usual 5-day course of treatment. In no case was there any evidence of drug intolerance. Such single-dose treatment should be of great service in antimalaria dispensary practice but in hospitals it should not replace the usual treatment with nivaquine, 0·6 gm. the first day, 0·5 gm. the second, and 0·3 gm. on each of the 3 following days, which the author considers the best course of treatment yet devised.

Norman White

EDGCOMB, J. H., ARNOLD, J., YOUNT, E. H., Jr., ALVING, A. S., EICHELBERGER, Lillian, JEFFERY, G. M., EYLES, D. & YOUNG, M. D. **Primaquine, SN 13272, a New Curative Agent in *vivax* Malaria : a Preliminary Report.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 285–92.

The authors report the results of preliminary clinical trials with primaquine [8-(4-amino-1-methylbutylamino)-6-methoxyquinoline, or SN 13,272] in reducing the relapse rate of the Chesson strain of *vivax* malaria. Primaquine belongs to the same family as pamaquin and isopentaquine, the 3 compounds differing only in the characteristics of the terminal amino group.

The subjects of the experiment were white, healthy volunteers from the Illinois State Penitentiary, with no previous history of malaria. Infection was by the bites of 10 infective mosquitoes. Drug administration was begun early in the course of the clinical attack, with the object of reducing acquired immunity to a minimum. Parasite counts were made daily during the immediate follow-up period, and thereafter at frequent intervals up to one year.

When primaquine was given alone in 6 divided doses daily, curative effect was demonstrated with doses as low as 22·5 mgm. (base) per day. The same dosage given concurrently with 1·6 gm. of quinine (base) prevented relapse in almost 100 per cent. of cases. Increasing the dose of primaquine to 60 mgm. increased the toxicity, without concurrent therapeutic benefit. On an equal weight basis, primaquine appeared to be about 4 times as active as the best of the other members of the family. Toxicity tests indicated that it was also considerably the least toxic.

The authors conclude that primaquine is superior to both pamaquin and isopentaquine, because it will cure severe infections of *vivax* malaria in dosages that are relatively non-toxic in white subjects and because there is a wide range between the clinically effective and maximum tolerated doses.

G. Covell

SMITH, C. C. **A Short Term Chronic Toxicity Test.** *J. Pharmacol. & Exper. Therap.* 1950, Dec., v. 100, No. 4, Pt. 1, 408–20, 2 figs.

The author's aim has been to devise a reliable test giving the maximum information on the toxicity of a drug with minimal expenditure of time and material during the screening of a series of potential therapeutic agents. Results on relative toxicity have been based on the effects on growth of rats, lethal dose, pathological changes produced and the related blood concentration attained, all within a period of 14 days. The amount of drug required is of the order of 7 to 8 gm. There are two stages in the test, firstly, that in which a dosage regimen and approximate lethal dose is determined. Secondly, toxicity is observed with reference to a standard drug having as near as possible similar chemical and physiological characters, with the use of the criteria outlined above. Normal male rats of identical age, 28 days being regarded as suitable, and around 55 gm. in weight are used. The doses are given by stomach tube or in diet for 11 days to groups of 6 rats, one of which received the drug under test, another group the reference compound and the third untreated group acts as a control. Animals are weighed daily and the dose of drug is adjusted to weight changes. On the 12th day the animals are killed, the necessary histological examinations made and blood levels of the drug determined. The methods of administration vary slightly, depending on whether the drug is believed to be slowly or quickly excreted. For details the original article should be consulted. It is claimed that the test will indicate differences in toxicity of the order of 25 per cent., and that results are repeatable with an accuracy of about 30 per cent. There is no marked increase in accuracy when the 11- to 14-day period of treatment is extended to 21 days, but it is much more reliable than a 7-day test. Complete data on toxicity are given for a number of well-known antimalarial drugs and some others. *J. D. Fulton*

CIUCA, M. Boj proti malarii v lidové republice rumunské. [**The Campaign against Malaria in the Rumanian People's Republic.**] *Časopis Lékařů Českých.* Prague. 1950, Dec. 21, v. 89, No. 51, 1430–35.

Malaria has increased greatly in Rumania since the war and has reappeared in districts which have been free from the disease for 25 years. In 1945 and

1946 an epidemic occurred in Tulcea on the Black Sea, with a mortality of up to 250 per 100,000. The disease was made notifiable in 1949 and 233,962 cases were recorded. An antimalarial campaign was organized by the Ministries of Agriculture, Works and Supply in collaboration with technical experts. Efforts were devoted to eliminating the human source of infection by treatment and to extirpating the vector, and an extensive programme of training courses in malariology was instituted. A network of 65 antimalarial stations was set up ; these were situated in affected areas and were equipped for diagnosis, treatment, and mosquito extermination. Research was also carried out in the stations on the association of malaria with climatic, geographic and social factors. The stations had a total staff of 634, including 27 malariologists, 22 entomologists, and 288 antimosquito squad operators. The vigorous application of chemotherapy and chemoprophylaxis had little effect in eradicating the reservoir of infection ; thus in 1949, when 95 per cent. of cases were under treatment and 247,701 persons were given chemoprophylaxis, the incidence in the collective farms was still 20 per cent. Mosquito eradication by residual insecticides was much more effective in reducing the incidence and also much cheaper. Work was also carried out to determine a suitable dosage of paludrine [proguanil] chloroquine and other synthetic agents for use in prophylaxis and treatment. It was found that the disease could be completely suppressed in an area by giving 300 mgm. paludrine or 500 mgm. chloroquine in weekly doses to the entire population. The effectiveness of the campaign is shown by the following figures among others ; a reduction of incidence in a particular collective farm from 3,376 cases in 1947 to 49 relapses in 1949 ; a reduction of the infection rate from up to 76·64 per cent. in 1947 to 0·9 per cent. in 1949. The incidence of malaria was also greatly increased when the cultivation of rice was begun in marshy districts but fell again when antimalarial measures were introduced.

D. J. Bauer

MacLeod, R. C. **Prophylactic Proguanil in the Southern Highlands of Tanganyika.** [Memoranda.] *Brit. Med. J.* 1951, Feb. 10, 282.

In April 1948, the Overseas Food Corporation took over as a training centre a former Polish refugee camp at Ifunda (5,500 feet) in the Southern Highlands of Tanganyika. The camp is badly sited on a hillside, sloping to a swamp, the lower edge being about 500 feet from the swamp. The mosquitoes in the swamp gain access to the camp only when the prevailing wind shifts or dies. The prominent species are *Anopheles gambiae* and *A. funestus*, but *A. coustani* is sometimes found.

When the camp was occupied, the medical staff advised the use of the usual personal precautions against malaria and the taking of one tablet of proguanil daily throughout the year. African quarters and ancillary outhouses were sprayed with " Gammexane P. 520 " monthly. Residual spraying of houses with DDT was offered to European staff, but in the initial absence of malaria and mosquitoes, most refused the offer. It is indeed observed that personal precautions had been largely ignored and " the use of nets and of ' flitting ' was small and most irregular."

During the second half of 1949, there was a gradual increase in the incidence of malaria, and in November it was found that 39 out of 51 Europeans on the site showed *P. falciparum* in the blood. Of these 39, there were 16 who took proguanil regularly and 8 of these developed overt malaria. Of 11 who took proguanil irregularly, 6 developed overt malaria and so did 10 of the remaining 12 with positive blood smears who took no proguanil. Of the 12 remaining persons whose blood was negative in November, 6 had had positive smears earlier in the year. The findings are shown in detail in 3 tables.

Great care was taken in checking the stories of proguanil taking and there seems no doubt that the persons were properly grouped in this respect. The attacks of malaria were mild in all cases.

Positive findings were related to the position of the houses relative to the swamp. Thus, in the rows of houses situated respectively 500, 700 and 1,100 yards from the swamp, only one of 14, none of 7 and 6 of 31 residents had been free from the disease. [In noting the mildness of the disease, the author states that " That is, the symptoms were those commonly occurring in malaria at high altitudes in East Africa ". This does not altogether correspond with the experiences of many workers in East Africa who have encountered severe outbreaks at high altitudes. See GARNHAM, this *Bulletin*, 1945, v. 42, 959 ; 1949, v. 46, 898.] *H. J. O'D. Burke-Gaffney*

PAUL, J. H., WATSON, R. B. & LIANG, K. C. **A Further Report on the Use of Chlorguanide (Paludrine) to suppress Malaria Prevalence in Southern Formosan Villages.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 356–65, 8 figs.

In a previous communication [this *Bulletin*, 1950, v. 47, 806] the authors reported results of one year's trial of chlorguanide [paludrine, proguanil] as a suppressive and therapeutic agent in southern Formosa. An account is now given of a further year's study of the same drug as a suppressive in 2 other villages, Ssu Ling and Ssu Ch'un, in the same locality, with the use of a simplified administrative technique. Spleen and blood surveys were made before the commencement of drug administration, at intervals of 3 months thereafter, and at the completion of the study.

Suppressive therapy was administered once weekly in Ssu Ling and once every 2 weeks in Ssu Ch'un, everyone being treated except infants of less than 12 months. The doses employed were : 1–5 years, 0·05 gm. ; 6–15 years 0·1 gm. ; 16 years and older, 0·2 gm. No special measures were taken to ensure that the drug was actually taken, beyond instructing the villagers to swallow the tablets with a draught of tea.

The parasite rates, initially 13·03 and 10·7 per cent. respectively, fell to 1·13 per cent. and 1·47 per cent. at the second survey, and remained at approximately these levels during the remainder of the experiment. Spleen rates also declined and the average enlarged spleen was reduced in size. Contrary to expectations, approximately the same results were obtained whether the drug was administered at weekly or at bi-weekly intervals ; while the simplified administrative technique employed (which did not include special precautions to ensure that the drug was actually swallowed or therapeutic treatment of overt cases of malaria) gave approximately the same results as were recorded in the earlier study, which included both these measures.

The authors conclude that in Formosa the best general approach to malaria control on an island-wide basis is through the use of a residual insecticidal spray, supplemented by the treatment of cases of malaria with chlorguanide or other potent drug. They believe that under those conditions the new synthetic drugs should usually be reserved for the therapeutic treatment of malaria, rather than for suppressive programmes. *G. Covell*

NEILD, F. G. **Mosquito Control in the British Sector of Berlin—Summer 1949.** *J. Roy. Army Med. Corps.* 1950, Oct., v. 95, No. 4, 222–9, 2 maps.

The rubble left by war has increased mosquito breeding places in and around Berlin, and the return of soldiers and others has multiplied the numbers of gametocyte carriers. As a result a nuisance has been created and malaria has

reappeared. The peak was reached in 1946 with 1,089 cases, and in the next two years 402 and 230 fresh cases were recognized. The 1949 figure of 27 refers to the Western Sector only.

Divided political and military power made any integrated scheme of amelioration impossible. Russian action is not known ; the French did not appear to be worried ; the Americans undertook domestic spraying in their troops' quarters and some distribution of DDT from aircraft ; the British had a plan. A Police Ordinance required civilian action but conflicted with an exhortation on another subject. Troops were required to comply with clothing regulations and repellents were supplied to them. Quarters were treated with DDT and oil was used as a larvicide. The measures are considered to have been most successful. *G. Macdonald*

MECHALI, D. Efficacité et coût de la prophylaxie du paludisme par lutte anti-imaginale au Maroc. [**Efficacy and Cost of Malaria Prevention by Destruction of Adult Mosquitoes.**] *Bull. Inst. Hyg. Maroc.* 1949, v. 9, Nos. 3/4, 165–80, 1 map & 1 chart.

The observations described were carried out in the north-west of the Gharb, a vast plain formed by the basin of the Sebou River, separated by sand dunes from the Atlantic seaboard. On the landward side of these dunes there is an uninterrupted chain of marshes or "*merjas*" which contain water throughout the year. The area selected for the experiment lies behind one of the largest of these merjas, the Ras ed Daoura. It has an area of some 90 square kilometres and contains 10 villages (*douars*), with a total population of about 3,000. The primitive dwellings are of three types of construction : the *khaima*, a tent made of very coarse fabric enclosed round the lower part by a palisade of cane ; the *noualla*, a conical cylindrical hut made of intertwining branches and covered with canes and thatch ; and the mud hut with thatched roof, generally containing but one room. The interior surfaces of the first two types of dwelling are obviously very irregular. With but one exception there is no high vegetation near the villages that could offer shelter for anophelines. There is only one malaria vector, *Anopheles maculipennis sicaulti* ; this was extremely prevalent. Spleen rates in the spring varied from 25 to 75 per cent., parasite rates from 5 to 30. Prophylactic medication has been in use among the children for some 15 years.

DDT residual spraying was carried out in 1949. Suspensions of DDT, of various concentrations and doses were used. A 1 per cent. suspension was more effective than a 0·2 suspension ; the more dilute suspension entailed the loss of a considerable amount of the spray by running down the wall. A dose of 1 gm. per square metre of surface sprayed was as effective as 2 gm. When anophelines reappeared the spraying was repeated. As an antimalarial measure the procedure was effective. In 1949 the number of cases of malaria confirmed by blood examination was only 2·4 per 1,000 in the treated *douars* as compared with 15·7 per thousand among the remaining 14,000 inhabitants of the Tazi medical sector. The cost of spraying is comparable to the cost of medical prophylaxis for the whole population but considerably higher than it would be if such medication were confined to the child population, which is the usual procedure in Morocco. *Norman White*

BERNARD, P. La prophylaxie antipalustre au moyen des insecticides de contact à Madagascar. [**Malaria Control by means of Contact Insecticides in Madagascar.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 505–12.

This paper describes the inauguration of a scheme to control malaria in Madagascar by DDT residual spraying. Before taking control of the

Anti-malaria Service in Madagascar the author was able to study the methods employed by the Rockefeller Foundation Mission in Sardinia in its attempt to eradicate anophelines from that island.

The DDT campaign in Madagascar began in September 1949. Owing to the large size of the island it will be long before protection can be thus afforded to the whole population. In the meantime weekly prophylactic doses of synthetic drugs are being given to all children from birth to school-leaving age. At the time of writing there were 24 spraying squads at work, each consisting of six African workers under the direction of a European. Each squad has a lorry and six sprayers of the Galeazzi type. Work is being concentrated in the north of the island for the present. An emulsion containing DDT, octochlor and " Gammexane " is being used. During the first six months 71,000 houses, containing 250,000 rooms, were treated. It is too early yet to judge the results of the campaign, but search for mosquitoes in houses that had been sprayed 4 to 6 months previously warrants optimism. *Norman White*

SERGENT, Ed. & PONCET, A. De la virulence pour le mérion rongeur Nord-Africain de *Plasmodium berghei* hémosporidie d'un rongeur de l'Afrique centrale. [**Virulence of *Plasmodium berghei* for the North-African Gerbil.**] *Arch. Inst. Pasteur d'Algérie.* 1950, Sept., v. 28, No. 3, 323–34, 8 figs.

The authors report the results of a detailed study of the behaviour of *Plasmodium berghei*, the malaria parasite of a Central African tree-rat, in the North African gerbil, *Meriones shawi*. The virulence of *P. berghei* for the gerbil proved to be very slight : although all the animals (6) became infected after intraperitoneal inoculation, the number of parasites was always small, and they could be detected in the peripheral blood only for a few days in the course of 3–4 weeks. For comparison, mice and rats were inoculated with the same strain. Of 100 mice, all succumbed to the infection in about 10 days, after showing numerous parasites in their blood. As regards the rats, the course of the infection was similar to that in mice, but was not always fatal, the infection frequently becoming latent. *C. A. Hoare*

LEVADITI, C. & VAISMAN, A. Histo-pathologie de l'infection provoquée chez la souris par le *Plasmodium berghei*. Le rat, réservoir de virus. [**Histo-pathology of Induced *Plasmodium berghei* Infections in Mice. The Rat as a Reservoir of Infection.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 693–7, 4 figs. on 4 pls.

Two pathological conditions are described in the organs of white mice infected with *Plasmodium berghei*. The lesions are melanism and fatty degeneration and they are found particularly in the liver and spleen. In the liver, pigment granules are abundant in the macrophages of the sinusoids, in the Kupffer cells, and even in the parenchyma cells ; late in the infection, the pigment agglomerates in the region of the blood vessels, as a rule in proportion to the number of parasites present in the peripheral circulation. If the mice have been treated with aureomycin, the infection is prolonged, and provided that it is not eradicated, pigmentation of the liver is most intense. Fatty degeneration of the parenchyma cells is common, though it is sometimes found in the absence of pigmentation ; it is extreme in cases where death has been averted by the use of aureomycin.

The length of the infection in white rats was found to be at least 45 days. The blood might have shown no parasites for days, but on inoculation into white mice it would prove infective ; emulsions of brain, liver and spleen were similarly infective. *P. C. C. Garnham*

HOOGSTRAAL, H., HUFF, C. G. & LAWLESS, D. K. **A Malarial Parasite of the African Elephant Shrew,** *Elephantulus rufescens dundasi* **Dollman.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 293–306, 2 figs. [16 refs.]

This is the long awaited account of the malaria parasite found, by members of the United States Naval Medical Research expedition, in the elephant shrew of tropical Africa, about which brief stories were given in the lay or semi-lay Press in 1948 and after. The shrew is *Elephantulus rufescens dundasi*, and the parasite is almost certainly the same as the one described by RODHAIN *et al.* as *Plasmodium brodeni* from the larger elephant shrew, *Petrodromus*. More than 500 animals were examined in the southern Sudan, and over a hundred were sent to the United States for further study. The shrew is active during most hours of the day and night, though it sleeps during the hotter part of the day in the undergrowth ; it feeds on ants and termites and other insects.

The parasite is described in considerable detail. In the red blood corpuscles may be found immature stages from tiny solid bodies to " rings ", then vacuolated amoeboid forms, and finally after 50 hours' growth, mature male and female gametocytes. Pigment occurs at first in fine black grains evenly distributed in the cytoplasm, later as " golden to yellow brown " particles in the males and coarse and clumped black granules in the females. Multiple infections are common and sometimes 60 per cent. of the red cells contain parasites. There is little change in the erythrocytes and no stippling is found. All the blood forms are sexual in nature (and are thus non-transmissible on blood inoculation) ; asexual forms were sought for in vain in the tissues of heavily infected animals. If the type of development had resembled that of the merocysts of *Hepatocystis kochi*, then it should easily have been detected in some of these animals. [The authors state that infection in the shrew was strikingly seasonal ; from 100 per cent. in the rains to 25 per cent. at the end of the dry season, when immature stages in the blood were practically absent. This is in contrast to the incidence of *Hepatocystis* (=*Plasmodium*) *kochi* which remains constant throughout the year, as a result of persistent exo-erythrocytic schizogony. It may well be that schizogony in *P. brodeni* resembles that of some species of *Leucocytozoon* in being largely pre-erythrocytic, and only demonstrable in the youngest animals.]

Attempts were made to discover the vector of the parasite ; the following arthropods were rejected on general grounds—fleas, lice, simuliids, reduviid bugs, hippoboscids and argasid ticks—and probably *Phlebotomus* because this insect is common in the dry season when the parasite disappears. Many local and exotic species of mosquitoes were tested with negative results, but the authors conclude that the trials were not sufficiently extensive to enable them to exclude mosquitoes from the list of possible vectors.

The authors conclude with an interesting discussion on the status and relationship of this parasite, finally recommending that for the present it should be retained in the genus *Plasmodium*. *P. C. C. Garnham*

HUFF, C. G., MARCHBANK, Dorothy F., SAROFF, Agnes H., SCRIMSHAW, P. W. & SHIROISHI, T. **Experimental Infections with** *Plasmodium fallax* **Schwetz isolated from the Uganda Tufted Guinea Fowl** *Numida meleagris major* **Hartlaub.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 307–19, 15 figs.

A malaria parasite was isolated from the blood of a guinea fowl (*Numida meleagris major*) caught near Torit in the Equatoria Province of the Anglo-Egyptian Sudan. Infection took place in sub-inoculated chicks, which after 11 serial passages reached an intensity of 65 parasites per field, and resulted in the death of half the birds. Pigeons also were proved to be equally or more

susceptible. The parasite was identified as *Plasmodium fallax* which SCHWETZ had originally found in an owl at Stanleyville (*Arch. Inst. Pasteur d'Algérie*, 1930, v. 8, 289). The schizont grows from one pole of the erythrocyte to the other without displacing the nucleus ; curious circular vacuoles appear in the cytoplasm ; about 14 merozoites are produced of a *rouxi* type. The gametocytes are typical halteridia, again with vacuoles, and indistinguishable from those of *Haemoproteus* [so the need for caution in the identification of parasites in the blood of wild birds is thus demonstrated to be more than ever obvious]. The following species of mosquitoes were infected with the parasite—*Aëdes triseriatus*, *Aëdes atropalpus*, *Aëdes albopictus*, *Aëdes aegypti*, *Anopheles quadrimaculatus* and *Culex quinquefasciatus* [*C. fatigans*]. Infection was best obtained in *Aëdes albopictus* among which 73 per cent. became infected. Pre-erythrocytic schizogony was found to occur (*a*) after inoculation into the wing skin, in lymphoid cells, macrophage and " fat cells ", as cryptozoic schizonts containing 35 to 50 merozoites after 40 hours' growth ; and (*b*) after intravenous inoculation, very rarely indeed, in the liver and spleen. Exo-erythrocytic schizogony after establishment of the blood infection was absent. [In these abnormal hosts—pigeon and chicken—the type of tissue development may well be unnatural ; it would be interesting to know if phanerozoites occur in the guinea fowl.]

Transmission of the infection by mosquito bite to pigeons was carried out as a routine, and it was noted that the sporozoite-induced infections were less severe (probably because the birds had a longer time to develop an immunity than after the massive introduction of infected blood) ; they produced more gametocytes, however, and it is suggested that the latter can derive directly from a tissue schizont. *P. C. C. Garnham*

TERZIAN, L. A. **The Sulfonamides as Factors in increasing Susceptibility to Parasitic Invasion.** *J. Infect. Dis.* 1950, Nov.–Dec., v. 87, No. 3, 285–90, 3 figs.

As the author points out, while many of the factors which affect acquired immunity have been extensively investigated, little is known about innate immunity, which the author defines as the " inherent or constitutional degree of susceptibility or resistance of a host animal to a specific parasitic agent." The mosquito *Aëdes aegypti* was selected for these studies because its susceptibility to infection with the avian malaria parasite *P. gallinaceum* could be readily determined by counting the total number of oöcysts in the stomach wall of each insect host after an infective meal. The effect of sulphanilamide and sulphadiazine was studied by adding them in the desired concentration to the sugar solution on which the mosquitoes were fed. For this purpose groups of 50 mosquitoes from larval colonies of the same age were maintained apart. The adult mosquitoes had access to the sugar solutions, along with drugs when desired, 24 hours after emergence and for the following 72 hours. Experimental and control groups were then allowed to feed simultaneously on the same chicken infected with *P. gallinaceum* and subsequently had access to the appropriate solutions till the experiment ended. The total oöcyst count was made on the stomach wall of the experimental and control group on the same day, generally the 5th to 8th after infection. It was established that both the drugs, when present in 0·1 per cent. strength in the sugar solution, caused a maximal increase in susceptibility of the mosquitoes to infection, for the oöcyst counts were significantly higher in the experimental than in the paired control groups. This specific effect on susceptibility required an optimal drug concentration, for the effect, for some reason unknown, was decreased when the two drugs were given in 0·2 per cent. concentration. When 0·2 per cent. of *p*-aminobenzoic

acid was present in the mosquito diet along with 0·1 per cent. sulphadiazine the effect of the latter on the susceptibility of the host was nullified. Since *p*-aminobenzoic acid is an essential metabolite of the parasite during development, the action of the sulphonamides described is believed to be direct on the mosquito host by depriving it of its available *p*-aminobenzoic acid and thereby affecting a factor concerned in innate immunity. *J. D. Fulton*

Pick, F. Sur l'étiologie de la péricardite exsudative de la poule domestique au cours du paludisme expérimental à *Plasmodium gallinaceum* Brumpt 1935. [**Exudative Pericarditis in the Domestic Fowl experimentally infected with** *Plasmodium gallinaceum*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 544–5.

The autopsy of fowls, which had died as the result of malaria due to *Plasmodium gallinaceum*, frequently reveals the presence of exudative pericarditis, the cause of which is unknown. With the view to throwing light on the aetiology of this condition, the author, in collaboration with a pathologist, carried out post mortem examinations on a number of infected fowls. Sections of the heart showed severe lesions of the interstitial tissue of the myocardium, from which it was inferred that the pericardial exudate was due to mechanical causes. In the interstices of the myocardium were found numerous parasites as well as free pigment. However, the Prussian blue test did not reveal any iron pigment but only melanin. From these facts it is concluded that, although acute exudative pericarditis causing the death of the birds is a secondary condition, it is initiated by the myocardial lesions caused by malaria.

C. A. Hoare

TRYPANOSOMIASIS

Ferreira, F. da C. & de Almeida, C. L. Sobre a sintomatologia clínica da doença do sono. [**Clinical Symptoms of Sleeping Sickness.**] *Gaz. Méd. Portuguesa.* 1950, v. 3, No. 4, 769–84, 4 charts. [Numerous refs.] English summary.

Pires, F. A., da Silva, J. M. & Teles e Cunha, G. Posição actual da tsé-tsé na área da sitatonga circunscrição do Mossurize. Estudo comparativo da infestação por tripanossomas patogénicos nas *G. morsitans*, *G. pallidipes*, *G. brevipalpis* e *G. austeni*. [**Present Status of Tsetse in the Sitatonga District, Mossurise, Portuguese East Africa. A Comparative Study of Trypanosome Infections in Four Species of** *Glossina*.] Reprinted from *Moçambique*. 1950, June, No. 62, 59 pp., 4 coloured graphs, 1 coloured diagram & 1 coloured map on 3 pls. [31 refs.] English summary.

The report describes the physiography and types of vegetation that occur in a part of Portuguese East Africa. The authors are doubtless correct in relating the distribution of their four species of *Glossina* to that of particular types of woodland. We think, however, that they are too much inclined to accept the number of insects caught as an index of the abundance of different species : we should be particularly loth to accept this in relation to *G. austeni*, which may be most difficult to catch, even though large numbers can be shown to be present. We feel, therefore, some doubt in accepting the table and graphs which give the numerical frequency of different species of *Glossina* in different types of woodland.

A large number of dissections were carried out in the months July to November in two successive years. In all, more than 18,000 flies were dissected, about 7,000 *G. austeni*, 4,500 *brevipalpis* and nearly 3,500 of both *pallidipes* and *morsitans*. The dissections were evidently thorough and included an examination of the proboscis by the method of LLOYD and JOHNSON in addition to the dissection of the gut and salivary glands. The rates of infection were shown to be as follows : *austeni*, 13·5 per cent., *brevipalpis*, 3·8 per cent., *pallidipes*, 4·2 per cent. and *morsitans*, 12·9 per cent. Clearly then *G. austeni* and *morsitans* were of greater veterinary importance than either of the other species, though all of them were evidently dangerous.

The results of the dissections are tabulated to show separately *Trypanosoma vivax* (proboscis only) and *T. congolense* (proboscis and gut). There was evidence that *G. morsitans* and *austeni* are relatively more favourable to *T. vivax* than the other two species of tsetse ; they were infected about equally with both trypanosomes. This may be due, as the authors suggest, to some physiological differences between species of fly : equally well, perhaps, to different opportunities of infection in different types of territory. The authors give their results at considerable length and include the original figures as well as percentages and various " rates ". They calculate an index of transmissibility, as a product of two proportions : it is cumbersome, but appears to be legitimate.

The authors examined the blood of about 220 wild animals of many species mainly Ungulates and Carnivora. They discovered no trypanosomes of any veterinary significance, except that in two out of twelve waterbuck (*Kobus ellipsiprymnus*) they discovered organisms identified as *T. vivax* and *T. congolense*. *P. A. Buxton*

DIAS, J. A. T. S. Relatório sobre os trabalhos de estudo e controle das Glossinas *brevipalpis* e *austeni* na região do Maputo. [**Account of Investigations on the Control of *Glossina brevipalpis* and *G. austeni* in the Maputo Region.**] Reprinted from *Moçambique*. 1949, June, No. 58, 59 pp., 12 figs. on 6 pls. & 2 coloured maps on 2 pls. [23 refs.]

LEWIS, E. A. **Game, Tsetse and Trypanosomiasis Control.** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 134/0.* Léopoldville (Congo Belge). 1950, Sept. 7, 7 mimeographed pp.

The results of recent experimental researches on the control of trypanosomiasis by destruction of wild game are summarized. In several parts of Africa, notably Southern Rhodesia and Shinyanga (Tanganyika Territory), it has been shown that the destruction of game in an area is followed by the disappearance of *Glossina morsitans* ; at Shinyanga *G. swynnertoni* also disappeared and *G. pallidipes* was at least much reduced in numbers. In the Shinyanga experiment an area of about 600 sq. miles was isolated by natural and artificial barriers and more than 8,000 of the larger species of wild animals were killed ; it took about 4 years to exterminate the flies, and it cost about £30,000. Other well-known factors concerned in the question, such as vegetation and climate, are referred to. The reclamation of land for African settlement and agriculture is the main object of efforts to control trypanosomiasis by destruction of game ; it has been estimated that the African population [in such areas ?] will have doubled itself within the next fifty years and this will be accompanied by much destruction of game. The author quotes resolutions Nos. 3 and 4 passed by the conference on " Fauna of British Eastern and Central Africa ", in 1947 ; they refer to destruction of game to get rid of *G. morsitans* (No. 3) and the spread of various diseases of domestic stock by

wild animals, associated with the need to make isolated game reserves (No. 4) [this *Bulletin*, 1948, v. 45, 982]. *J. F. Corson*

GLOVER, P. E. **Game Destruction in Zululand—the Effect on** *G. pallidipes*. *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 136/0.* Léopoldville (Congo Belge). 1950, Oct. 1, 2 mimeographed pp.

This is a short note on game destruction carried out within and on the perimeters (buffer zones) of three game reserves in Zululand with the object of protecting farmers' live-stock from *Glossina pallidipes* and of observing the effect on the density of this tsetse fly. The game reserves were the Umfolosi [in the angle between the Black and White Umfolosi rivers], the Mkuzi [on the south bank of the Mkuzi river about 50 miles N.W. of the Umfolosi reserve], and the Hluhluwe reserve [between the other two]. Two campaigns were conducted : from June 1929 to December 1930 the shooting was done chiefly on the perimeters, 36,704 animals being killed, including 15,130 zebras ; from 1942 (Umfolosi) and 1944 (Mkuzi) to 1950, animals were shot both in the perimeters and within the reserves, and 8,499 were shot on the shores of Lake St. Lucia. Altogether 138,339 animals were killed. The total area in which the shooting was done was only 400–500 sq. miles. The shooting ceased in May 1950 and in September of that year duiker, steenbuck, warthog, bushbuck and reedbuck were found to be very numerous in the Umfolosi reserve where 70,000 animals had been shot in the preceding 7 years.

The density of the tsetse flies was greatest in 1931, it decreased steadily until 1938, remained steady until 1941, then increased rapidly until 1947 when an attack was made with insecticides sprayed from aircraft.

The author concludes that the increase of the fly-density was not prevented by the destruction of the wild game. *J. F. Corson*

PELLEGRINO, J. Novos dados sôbre a distribuição de triatomideos e sua infecção pelo *Schizotrypanum cruzi* no Estado de Minas Gerais (Brasil). [**New Data on the Distribution of Triatomids and their Infection with** *Trypanosoma cruzi* **in the State of Minas Gerais (Brazil).**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 639–67. [20 refs.]

The English summary appended to the paper is as follows :—

" A survey was made on the distribution of insect vectors of Chagas' disease in the State of Minas Geraes, Brazil.

" Triatomid bugs were found in 155 (39·94%) out of 388 counties of the State. In 94 counties the bugs were infected with *Schizotrypanum cruzi*.

" 14,978 triatomids were *T. infestans* (70·78%), 4,589 were *P. megistus* (21·68%) and 1,547 were *T. sordida* (7·31%). The other species (*P. geniculatus*, *P. diasi*, *T. arthurneivai*, *T. maculata* and *Ps. coreodes*) represented only 0·21 percent of the insects.

" 11,507 bugs were examined for *S. cruzi* and 3,007 (26·13%) were found infected."

DE FREITAS, J. L. P. Observações sôbre xenodiagnósticos praticados em reservatôrios domésticos e silvestres do *Trypanosoma cruzi* em uma localidade endêmica da moléstia de Chagas no Estado de São Paulo. [**Observations on Xenodiagnostic Studies of Domestic and Field Reservoirs of** *Trypanosoma cruzi* **in an Endemic Area of Chagas's Disease in the State of São Paulo.**] *Hospital.* Rio de Janeiro. 1950, Oct., v. 38, No. 4, 521–9, 4 figs.

The English summary appended to the paper is as follows :—

" The author reports the results obtained by the application of xenodiagnosis in about 85% of the dogs and cats and in some wild animals in a locality of the State of São Paulo where Chagas' disease is endemic.

" Xenodiagnosis has been applied in 563 dogs and in 161 (28·59%) of them it became positive ; in 492 cats and in 97 (19·71%) it became positive ; the same examination has been made in 18 armadillos (two *Dasypus novemcinctus* and sixteen *Euphractus sexcinctus*) and in all of them it was negative ; it has been applied also in 24 opossums (*Didelphis marsupialis*) and became positive only once.

" In this same locality the author applied xenodiagnosis in 530 human beings and in 30 of them (5·66%) it became positive.

" The author applies statistical tests to the above mentioned results and concludes to be statistically significant at the 5 per cent level the differences of percentages of positivity obtained between dogs and humans and between cats and humans.

" In the xenodiagnosis that have been positive 71·04% of the triatomid-bugs that have been fed on dogs became infected ; 67·58% of those fed on cats became infected and 60·41 of those fed on humans.

" The author applies the same tests above mentioned to these percentages ; the difference between the percentages of infected triatomid-bugs obtained among dogs and cats was not significant, suggesting that the infectivity of both these animals to the triatomid-bugs is the same. On the other hand, the difference of percentages obtained among dogs and humans was significant.

" The results above mentioned show that dogs and cats are very important reservoirs of *T. cruzi* in the locality, whereas wild animals are rarely infected there."

Cariola, J., Prado, R., Agosín, M. & Christen, R. Susceptibilidad de Hamster (*Cricetus auratus*) y Peromyscus (*Peromyscus maniculatus gambeli*) a la infección experimental por *Trypanosoma cruzi*, cepa Tulahuén. [**Susceptibility of the Hamster** (*Cricetus auratus*) **and Peromyscus** (*Peromyscus maniculatus gambeli*) **to Experimental Infection with** *Trypanosoma cruzi*.] *Bol. Informaciones Parasitarias Chilenas.* 1950, Oct.–Dec., v. 5, No. 4, 44–5.

The English summary appended to the paper is as follows :—

" The authors, testing the susceptibility to infection against a Chilean strain of *Trypanosoma cruzi* of Hamster (*Cricetus auratus*) and Peromyscus (*Peromyscus maniculatus*) find the first very susceptible, in contrast with the high resistance of the second."

Laszlo, Herta P. Recherches preliminaires sur la composition chimique de la fraction spécifique soluble obtenue par la méthode de Fuller de *Schizotrypanum cruzi*. [**Preliminary Studies on the Chemical Composition of the Specific Soluble Fraction obtained from** *Trypanosoma cruzi* **by Fuller's Method.**] *Hospital.* Rio de Janeiro. 1950, Oct., v. 38, No. 4, 621–4, 1 fig.

The English summary appended to the paper is as follows :—

" The specific substance from *Schizotrypanum cruzi* extracted by the method of Fuller gives a positive reaction with α-naphtol and after hydrolysis with phenylhydrazone and is reducing.

" This result lets us think that a part of this specific substance is a polysaccharide."

LEISHMANIASIS

BHENDE, Y. M., PURANDARE, N. M., BANKER, D. D., FIGUEREDO, N. & DESAI, S. D. **Outbreak of Kala-Azar in an Institution in Bombay.** *Indian Med. Gaz.* 1950, June, v. 85, No. 6, 237–9.

This is an elaboration of a paper already summarized in this *Bulletin*, 1950, v. 47, 337. The total figures are now 12 cases of kala azar diagnosed at autopsy and 8 among living inmates ; none of the additional patients had come from a recognized kala azar endemic area.

The number of sandflies caught in the Home is now 47, but the identification of the species is still awaited. It is now stated that leishmania have been identified in 5 of these sandflies.

The authors conclude that the additional data support the conclusion at which they arrived previously, namely :—" (1) In the outbreak investigated the primary source of infection could only be human. (2) When and how exactly was the infection introduced in the Home could not be stated definitely, but probably the infection was brought by some of the inmates who came from Madras—a heavy endemic focus of kala azar. (3) The sandflies existing in the compound of the Home caught the infection and transmitted it to new hosts. (4) Due to the diminished resistance of the patients suffering from leprosy, such transmission was facilitated."

It would appear that a reservoir of kala azar cases has been built up in Bombay.

[The reviewer's comments in the summary referred to above still hold good.]

L. E. Napier

LOFGREN, Ruth. **The Structure of *Leishmania tropica* as revealed by Phase and Electron Microscopy.** *J. Bacteriology.* 1950, Nov., v. 60, No. 5, 617–25, 9 figs. [19 refs.]

The advent of phase and electron microscopy has naturally stimulated the revision of the structure of pathogenic protozoa by these methods, as compared with the morphology revealed in preparations stained and examined by conventional methods. In the present paper a description is given of the results of a study of cultural forms of *Leishmania tropica* grown on N.N.N. slants. For the phase microscope, a fresh preparation was made from the condensation fluid, and the coverslip sealed with petrolatum. For the electron microscope, the material removed from the driest part of the slant was evenly dispersed in a drop of distilled water, and small droplets of the suspension were transferred to collodion-covered discs for observation. For the bright-light microscope, films were dried and stained by Giemsa's or Wright's methods.

Both the phase and electron microscopic observations confirmed the vesicular nuclear structure seen in stained films [prepared by the " wet " method], *viz.*, the presence of a central karyosome. The use of distilled water for the electron microscope preparation caused many of the flagellates to autolyse or burst, but such forms revealed certain features not seen in stained slides, *viz.*, surface striation of the body and the laminated structure of the flagella which appeared to consist of bundles of filaments. The " blepharoplast " [=kinetoplast] appeared to be circular and was enclosed in a membrane together with the axoneme and a ring-like body. The paper is illustrated by a number of photomicrographs. [From the description and illustrations it is evident that, except for some of the details noted above, phase and electron microscopy revealed far less of the morphology and cytology of leishmanias than a Romanovsky-stained preparation.] *C. A. Hoare*

CHAKRAVARTI, H. **Studies on Plasma Protein. I. Kala-Azar.** *Indian Med. Gaz.* 1950, Apr., v. 85, No. 4, 141–4, 2 figs. [15 refs.]

The plasma proteins were estimated in 57 unselected cases of kala azar at different stages of the disease. The method used was the " copper sulphate specific gravity and biuret method ". The diagnosis was confirmed parasitologically in all but four cases.

Total protein.—Hypoproteinaemia was observed in 9 cases (16 per cent.) and hyperproteinaemia in 20 (35 per cent.). In the rest it was within normal range.

Range 4·8 to 10·7 gm. per cent. ; mean 7·66±1·17.

Albumin.—This was lowered in 52 cases (92 per cent.) ; only in 5 (8 per cent.) was it within normal range.

Range 1·3 to 4·4 gm. per cent. ; mean 2·79±0·71.

Globulin.—Hyperglobulinaemia was observed in 48 cases (84 per cent.) and in the rest (16 per cent.) it was within normal limit.

Range 2·6 to 8·6 gm. per cent. ; mean 4·87±1·16.

A /G ratio.—The ratio was lowered in 54 cases (95 per cent.) and in 3 cases it was within normal range.

Range 0·2 to 1·7 ; mean 0·66±0·34.

The results were analysed according to the stage of the development of the disease. As histories are unreliable the size of the spleen was usually taken as the criterion.

In early kala azar, the total protein and albumin was lower than normal and the globulin was normal ; there was thus only a slight reduction in the albumin-globulin ratio. In the later stages of the disease, there was a progressively decreasing albumin. In the group with spleens more than four inches below the costal margin, the mean total protein was over 8 grammes per cent. and the albumin-globulin ratio was about 0·44 [according to the Figure (2), but this does not in any way correspond with the Table (I)].

The factors that influence the plasma proteins other than the duration of the disease are :—

Malnutrition usually causes a low total protein, 4·8 gm. per cent. in the case quoted.

Severe anaemia is also associated with a low total protein.

Oedema or ascites or both are often associated with advanced kala azar ; in the cases quoted the average total protein was about normal, but the albumin-globulin ratio was considerably lower, as low as 0·225 in one case.

It is considered that the low albumin-globulin ratio is due to liver dysfunction.

L. E. Napier

SABIDO, F. Contribuição para o estudo e tratamento do Kala azar infantil. (Revisão de 158 casos.) [**Infantile Kala Azar and its Treatment.**] *Bol. Clin. Hosp. Civis Lisboa.* 1950, v. 14, No. 4, 487–503, 1 chart. English summary.

Infantile kala azar is far from uncommon in Lisbon ; 158 cases were found among the records of 20,378 clinical histories. To these 158, females contributed 87 and males 71 ; by age, the largest number, 51, were 2 years old, next, 41, came the 3-year-olds, 23 were one year and under and 20 were 4 years old. Several cases were complicated by other conditions ; 19 patients had otitis, 26 bronchitis and 16 bronchopneumonia, 5 had noma and 22 were tuberculous ; those with noma and bronchopneumonia accounted for most of the fatalities. Diagnosis of clinically suspected cases was made by spleen puncture ; when bleeding and coagulation times were above normal, marrow

puncture was resorted to. In 10 patients both spleen and marrow puncture were carried out ; in all, the former gave positive results ; in 2 the latter was negative. There was one fatal case after spleen puncture, though 508 such punctures were done. This was in a patient in a very bad general state in an advanced stage of the disease and the bleeding and clotting time had not been tested. At autopsy a litre of blood was found in the peritoneal cavity.

The antimonial drugs used in treatment were tartar emetic, stibenyl, anthiomaline, neostibosan and Nibilos [the composition of this is not given]. The author did not find any antimony-resistant cases ; a few who had been sent in as such had received inadequate doses. The best drug, in the author's hands, was neostibosan ; he gave it for 12 days consecutively by intravenous injection, in daily doses of 0·05–0·15 gm. to the very young, and 0·1 to 0·2 gm. to the older children. If this did not suffice to cure, the course was repeated after a fortnight's interval.

Altogether cure was obtained in 81·9 per cent. [? 129 patients ; the summary states 89·1 per cent. and 18·1 per cent. as fatal ; the text gives 81·9 per cent. recoveries and 18·1 per cent. fatalities, *i.e.*, 29 deaths]. *H. Harold Scott*

Sen Gupta, P. C., Panja, D. & Banerjee, A. K. **An Unusual Case of Post-Kala-Azar Dermal Leishmaniasis.** *Indian Med. Gaz.* 1950, Apr., v. 85, No. 4, 138–41, 5 figs. on 3 pls.

An Indian boy of eighteen years gave a history of having had kala azar ten years previously. He had been treated by intravenous injections and cured of the febrile attack. Eighteen months later depigmented and nodular lesions appeared on his face and body and after a time he underwent another course of treatment which resulted in only slight improvement. Eighteen months after the course of treatment, the patient noticed that the nodules had been replaced by depressed scars.

When he was seen he had three types of lesion, (i) hypo-pigmented areas widely distributed over the face, trunk and limbs, and on the mucous membrane of the palate, (ii) nodular lesions on the chin, trunk and external genitals, over which the skin was irregularly thinned, appearing like tissue paper in some instances, (iii) depressed scars, which were darker than the surrounding skin, around the mouth, on the cheeks, on the eyelids, and at the canthi of both eyes.

Smears from the nodular lesions showed leishmania. No acid-fast bacilli were found, the Mantoux test and the Wassermann and Kahn tests were negative.

The histological changes in a biopsy specimen of a nodule showed : thinning of all the layers of the epidermis which was, however, intact. In the dermis, the papillae were flattened and there were areas of granulation tissue of varying vascularity. A few histiocytes containing leishmania were observed. In one area " granulation tissue containing a large collection of giant cells of the Langhans type was seen situated close to the epidermis. There were no leishmaniae or acid-fast bacilli in this focus. There was some granular homogenous degenerated material about the centre of this collection of giant cells. The other cells in this focus were the histiocytes, lymphocytes and a few plasma cells. The overlying epidermis was greatly thinned out and the basal layer contained much less pigment than the adjacent areas. There were bands of fibrous tissue lying internal to and also extending through this area."

In a section stained with van Gieson's stain marked proliferation of the collagen fibres was noted, and there were interlacing bundles of coarse collagen fibres in both the papillary and the reticular layers, and extending between the cells of the basal and malpighian layers of the epidermis.

The authors point out that the tuberculoid focus and the excessive amount of fibrous tissues are unusual features in the histopathology of post-kala-azar dermal leishmaniasis and for this reason they have added the label "tuberculoid type".

[It appears that the biopsy was from a nodule, the special clinical feature of which was the thin epidermis. This is not a very unusual characteristic of nodules, whereas the pigmented depressed scars are unusual lesions and it would have been interesting to have learnt the histopathology of these lesions.]

L. E. Napier

Pizzillo, G. Leishmaniosi cutanea e fenomeni interferenziali. [**Cutaneous Leishmaniasis and the Interference Phenomenon.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Dec., v. 31, No. 12, 903–29, 6 figs. English summary. [25 refs.]

Three cases are presented in which an oriental sore was present together with an infection with malaria. Treatment of the former was not successful until the malaria had first been dealt with. The author coins for the combination the term "Palu-leishmaniasis".

H. Harold Scott

Poul, J. Sur la fréquence de la leishmaniose canine à Alger et sur la valeur diagnostique de la formolgélification. [**The Incidence of Canine Leishmaniasis in Algiers and the Diagnostic Value of the Formol Gel Test.**] *Arch. Inst. Pasteur d'Algérie.* 1950, Dec., v. 28, No. 4, 449–56. [22 refs.]

YELLOW FEVER

Kumm, H. W. & Laemmert, H. W., Jr. **The Geographical Distribution of Immunity to Yellow Fever among the Primates of Brazil.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 733–48, 2 figs. [32 refs.]

A survey of immunity to yellow fever among the primates of Brazil has been continuing for the past 15 years and this paper summarizes the results. Monkeys and marmosets were trapped and their sera tested for specific neutralizing antibodies. More than 5,800 such sera have now been tested. It is shown that immune primates have been found everywhere that extensive surveys have been made. The wide extent of specific immunity among primates captured in nature confirm the fact that jungle yellow fever has been prevalent throughout most of Brazil during the last 15 years. [This paper records a lot of detailed information which is impossible to abstract.]

Forrest Fulton

Haddow, A. J. **A Note on the occurrence of *Aëdes* (*Stegomyia*) *simpsoni* Theobald in the Canopy of Rain-Forest in Bwamba County, Uganda.** *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 238–41. [16 refs.]

A series of six 24-hour catches in forty localities at both ground-level and in the tree canopy (usually 50–60 feet above ground-level) in a rain-forest area in Bwamba County resulted in total catches at the two levels of 30,611 and 10,060 specimens of mosquitoes respectively. These collections included 47 specimens of *Aëdes simpsoni* from ground-level and 42 from the canopy platforms. Most of the localities from which *Aëdes simpsoni* was taken were within about a quarter of a mile of banana plantations. It is considered that this species, the dominant mosquito of banana plantations in Uganda, infrequently visits the canopy of

the forest and may acquire an infection of yellow fever by feeding on monkeys, such as *Colobus* and *Cercocebus*, which restrict their movements to the forest-canopy.

Aëdes africanus was the only mosquito to occur in all of the forty collections from the forest-canopy. Only one specimen of *Aëdes aegypti* was found at ground-level, and one in the forest-canopy ; both collections were from points near native huts. *D. S. Bertram*

KUMM, H. W. & LAEMMERT, H. W., Jr. **A Study of the Concentration of Yellow Fever Virus which will infect certain Species of Aedes Mosquitoes.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 749–55, 1 fig.

This important paper attempts to define the concentration of circulating yellow fever virus in certain primates which is necessary before an insect vector becomes infected by biting the host. Howler monkeys, *Alouatta caraya* and marmosets, *Callithrix jacchus* were used as the hosts and *Aëdes aegypti*, *Aëdes leucocelaenus* and *Aëdes scapularis* as insect vectors. The virus was the Olímpio Christo strain of jungle yellow fever virus. The titre of virus in the blood of the vertebrate hosts was estimated by intracerebral inoculation into mice, and batches of mosquitoes were allowed to feed on the infected monkeys or marmosets. After the mosquitoes had been kept at 28°C. for 28 or more days, they were ground up and tested individually for virus by intracerebral inoculations into mice. In a few instances individual mosquitoes were tested by bite.

Half or more than half of the mosquitoes which fed on primates circulating yellow fever virus at titres of 10^{-5} and more, became infected. The lowest concentration at which transmission by bite occurred was 10^{-3}. This kind of quantitative information is essential if the important reservoirs of the yellow fever virus are to be inferred from laboratory tests of susceptibility.

Forrest Fulton

LAEMMERT, H. W., Jr. & KUMM, H. W. **The Susceptibility of Howler Monkeys to Yellow Fever Virus.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 723–31, 3 figs. [13 refs.]

In 1931 DAVIS [this *Bulletin*, 1931, v. 28, 727] infected with yellow fever virus a red howler monkey, *Alouatta seniculus* by mosquito bite, and he was able to recover virus from the blood of the monkey. It is now shown that two other species of Brazilian howler monkeys, *Alouatta caraya* and *Alouatta guariba clamitans* may be infected with the Olímpio Christo strain of jungle yellow fever virus, by the bite of infected *Aëdes scapularis* and *Aëdes leucocelaenus*. Since cyclic transmission is readily obtained, the authors speculate that the howler monkey may be an important reservoir of the virus. Although *Aëdes scapularis* has not been found infected with yellow fever virus in nature, it is possible that this mosquito plays an important part in the survival of virus in the winter months in south Brazil. *Forrest Fulton*

MATHIS, C. La vaccination contre la fièvre jaune. [**Vaccination against Yellow Fever.**] *Bull. Acad. Nat. Méd.* 1950, v. 134, Nos. 33/34, 644–8. Discussion 648–51.

This paper, in the form of a discussion, is a spirited defence of the French yellow fever vaccine prepared from mouse brain. It is confidently asserted that this vaccine is a much better antigen than the American vaccine prepared in chick embryos with the 17D strain. The trump card is the request by the U.S. Navy for supplies of the vaccine to protect personnel during an epidemic of yellow fever in the Panama district. There is, however, no doubt that the

French vaccine does give rise to a considerable number of post-inoculation reactions. If the vaccine is administered subcutaneously as many as 40 per cent. of the recipients may suffer some illness ; and even by scarification 24 per cent. suffer reactions.

This is a strong argument against the vaccine, for the 17D strain seldom gives rise to any symptoms.

A reasonable compromise, which was in fact made by the U.S. Naval authorities in Panama, is to give the mouse brain vaccine to those who already have a basal immunity to the 17D strain, but who require, for some special reason, added protection.

It seems probable that the few cases of encephalitis which follow administration of the mouse brain yellow fever vaccine, are due to an actual infection with the vaccinating strain, and not to a demyelinization from the injection of heterologous brain tissue. *Forrest Fulton*

RABIES

PANDIT, S. R. **Two Instances of Proved Rabies in the Tiger.** *Indian Med. Gaz.* 1950, Oct., v. 85, No. 10, 441.

The author from the Pasteur Institute, Shillong, refers to the finding of Negri bodies in the brains of two tigers, one in 1943 and one in 1950. In the first case, the tiger had severely mauled 18 people in 24 hours and in the second the animal had attacked 14 persons, some cattle and a dog, fatally injuring three persons and the dog.

The author speculates on the extent to which "rabies is responsible for the man-eating propensity of tigers". *H. J. O'D. Burke-Gaffney*

REAGAN, R. L. & BRUECKNER, A. L. **Electron Micrographs of Negri Bodies found in Rabies.** *J. Infect. Dis.* 1950, Nov.–Dec., v. 87, No. 3, 213–16, 6 figs. on 2 pls.

After futile attempts to study histological sections and trypsin digested mouse brain material containing Negri bodies, the following technique was evolved : Electron microscope mesh screens covered with parlodion membrane were dipped in 10 per cent. formalin and then lightly touched to the Ammon's horn. After they were dried, the preparations were examined and some of them showed Negri bodies with an inner structure compatible with the form of elementary bodies. The appearances are shown in six photomicrographs. *C. Klimt*

BERKE, Z. & ÇILESIZ, A. Bazi antibiyotiklerin kuduz virüsü üzerine tesiri hakkinda denemeler. [**Experiments concerning the Actions of some Antibiotics on Rabies Virus Fixe.**] *Türk Ijiyen ve Tecrübi Biyoloji Dergisi.* Ankara. 1950, v. 10, No. 3, 373–89. German summary 390–93.

Aureomycin solutions were tested for their neutralizing capacity of rabbit brain fixed virus suspension. Solutions above a level of 5 per cent. (weight) were found to inactivate the virus after 2 hours in the cold.

Treatment experiments with aureomycin of rabbits infected intracerebrally or intramuscularly with fixed virus by intravenous medication resulted in a prolonged incubation period and in later death. Oral medication had no such effect. [For similar results see also REMLINGER and BAILLY, this *Bulletin*, 1950, v. 47, 1194.]

Terramycin was tested similarly. If the highly acid solutions are not neutralized a strong virucidal effect *in vitro* has been noted ; 0·025 gm. inactivated as much as 2 cc. of a 0·5 per cent. fixed virus rabbit-brain suspension after two hours standing in the cold.

Because of the failure of neutralized terramycin solutions to act *in vitro*, no intravenous treatment experiments were attempted. Oral treatment initiated on the 4th day after infection, however, was tried with negative results. *C. Klimt*

DE MAGISTRIS L. Il comportamento del miocardio in alcune infezioni sperimentali. Nota III. Il comportamento nell'infezione rabbica sperimentale. [**The Myocardium in some Experimental Infections. III. Experimental Rabies.**] *Acta Med. Italica.* 1950, Oct., v. 5, No. 10, 353–4. [12 refs.]

The English summary appended to the paper is as follows :—

" In the experimental Lyssa the author has not observed a degenerative myocardiopathy."

TENBROECK C. **Prevention of Street Virus Infection by Vaccine.** *Proc. Soc. Exper. Biol. & Med.* 1950, Nov., v. 75, No. 2, 528–31.

A number of very important issues in the field of rabies have been successfully attacked experimentally by the author. First of all he furnishes proof that rabies street virus infection of laboratory animals can be prevented by curative treatment with vaccine, this in spite of an incubation period with an average of only 10 days. Guineapigs were infected intramuscularly with second passage material from guineapigs in a 10^{-3} dilution of 10 per cent. brain suspension, and one or repeated immunization doses of 1 cc. of 2 to 4 per cent. mustard-inactivated vaccine were administered. Experimental evidence was also furnished to show that vaccine given before infection affords the best protection, but that it makes little difference whether after infection the vaccine is given immediately or as much as 24 hours later, and that single-dose immunizations give at least equal results to the same amount distributed over a number of days. Besides these reassuring results, two disturbing facts have, however, been discovered, namely that different batches of vaccine show optimal immunizing capacity after varying routes of application, *i.e.*, intraperitoneal, subcutaneous and intramuscular, and that vaccination which does not fully protect may result in a somewhat higher attack rate than is encountered among the unvaccinated controls (this latter experience has also been found in mice, where not only shorter but also more extended incubation periods were observed).

In summary, the results obtained underline more than ever the necessity of immunizing with the most antigenic product possible in order not to do more harm than good. They also point out that the demonstration of post-infectious effectiveness of rabies vaccine may lead to the development of a potency test which comes as close to reality as one could hope for.

C. Klimt

TENBROECK, C. & HERRIOTT, R. M. **Mustard Inactivated Rabies Vaccine.** *Proc. Soc. Exper. Biol. & Med.* 1950, Nov., v. 75, No. 2, 523–8.

A killed rabies vaccine with sulphur mustard (bis (beta-chloro-ethyl) sulphide) as inactivating agent was prepared by adding equal parts of the saturated solution (0·01 to 15 cc. water) to 20 per cent. infected brain suspensions. This mixture was adjusted and maintained at *p*H 7·3, allowed to stand for two

hours at room temperature (25°C.) and then stored in the refrigerator. Careful tests, which included blind passage of brain material and the demonstration of the absence of masked live virus through interference with inert virus particles, proved that all virus had been killed by this procedure.

The potency of this vaccine was tested and compared with others by the method developed by the authors [this *Bulletin*, 1950, v. 47, 844].

Rabbit, mouse and guineapig brain vaccines were compared and the last was found to be the least dependable.

Comparison with phenol-killed vaccines regularly showed the superiority of the mustard vaccine.

UV-irradiated vaccine was about equal in potency when the authors' guineapig potency test was employed. Only one of five mustard vaccines passed the 1,000 LD_{50} protective doses mark, required for release of rabies vaccines in the U.S.A., while all five UV-irradiated vaccines prepared from the same batches passed.

Live fixed virus showed protective values 5 to 10 times superior to the mustard vaccine, but immunizing doses were approaching the minimal infective dose as some of the animals died of fixed virus rabies prior to challenge.

Toxicity tests in mice, guineapigs and dogs, by the intracutaneous, subcutaneous, intraperitoneal and intracerebral routes, showed the vaccine to be innocuous. No tests have as yet been performed in man.

Stability tests showed that the vaccine had only an inconsiderable loss of potency after one year's storage at refrigeration temperature. Freeze-drying resulted in marked loss of potency, but it remained stable thereafter.

Other mustards (nitrogen and methyl sulphur) were also shown to be potent virus inactivators and to give products of some antigenicity. Further tests are required, as the nitrogen mustards have the advantage of being accurately weighable and of dissolving readily in water. *C. Klimt*

YAOI, H., NAKAGAMI, S., NAKANO, M. & KONDO, A. **Studies on the Rabies Vaccine. IInd Report : Comparison of Pasteur's Vaccine, Phenol-Vaccine, Formalin-Vaccine with Merzonin-Vaccine.** *Japanese J. Exper. Med.* 1950, July 30, v. 20, No. 5, 597–604.

NAKANO, M., KONDO, A., YAOI, H. & NAKAGAMI, S. **IIIrd Report : on the Antigenicity of the Fixed Rabies Virus, inactivated by Mercurochrome or Merphenol and Heating.** *Ibid.* 605–14.

KONDO, A., YAOI, H., NAKAGAMI, S. & NAKANO, M. **IVth Report : on some Factors influencing Antigenicity of Merzonin-Vaccine.** *Ibid.* 615–25.

[The 1st Report has already been abstracted in this *Bulletin*, 1951, v. 48, 34.]

II. The supernate of a 10 per cent. rabbit brain suspension of rabies virus was divided into two parts, and 0·2 per cent. merzonin was added to one and heated for 5 days at 37°C., and 0·25 per cent. formalin was added to the other and stored at 5°C. for 12 days. Both vaccines were thus inactivated. The authors' modified Habel test demonstrated a log. protection value of about 3 for the merzonin and of only one for the formalin vaccine.

Similar comparison was made with phenolized (0·5 per cent. 5 days at 37°C.) and with 1-day Pasteur vaccine. Both these vaccines still contained some live virus. Merzonin-inactivated vaccine seemed to be superior to phenolized and about equal to Pasteur 1-day cord vaccine [dilution of the latter not given]. [From the statistical point of view the 3–5 mice used per dilution cannot be regarded as sufficient. Twelve animals are commonly taken, allowing for two accidental deaths. In a number of instances the range of the experiment did

not cover the 50 per cent. mortality end-point, thus making calculation of results impossible.]

In a postscript, claim is made to the effect that every lot of merzonin vaccine prepared subsequently had protected against 1,000 LD_{50} or over. No loss of potency could be detected after storage for 87 days at room temperature. Twenty persons have so far been treated with "intradermal" merzonin vaccine without failure.

III. In this experiment, 0·2 per cent. mercurochrome inactivated the supernatant of a 10 per cent. infected brain suspension of rabies virus after incubation for 5 days at 37°C. A mouse potency test demonstrated this product to be antigenic in the same order as merzonin-inactivated vaccine. On comparing various concentrations above and below 0·2 per cent. of mercurochrome, 0·2 per cent. was found to yield the best results. Merphenol was tested in similar ways and gave equal results, its optimal concentration falling between 0·1 and 0·01 per cent.

Comparative mouse potency tests of merphenol (0·1 and 0·01 per cent.), merzonin (0·1 per cent.) and Pasteur 1-day cords showed that the 0·01 per cent. merphenol and the merzonin-inactivated vaccines were best and possessed protection values of slightly over 3 logarithms.

IV. Merzonin-inactivated vaccine was kept at 37°C. for periods varying between 5 and 30 days. At the 30-day limit of the testing period there still remained some protective power, the steepest drop having occurred during the first 2 weeks.

Freeze-drying of merzonin vaccine caused only inconsiderable loss of potency. Merzonin of differing origin and in dilutions of 0·1 to 0·02 per cent. had no detectable influence on the antigenicity of the final product.

Human brain street virus inactivated either with merzonin or with formalin gave no protection in mice when challenged with the Nishigahara fixed virus. [The street virus employed titred in mice only just over 10^{-2}, thus indicating that only about 1 : 10,000 of the quantity of antigen normally present in fixed virus vaccines had been incorporated. This, together with the heterologous challenge, a factor recognized by the authors, would fully explain the inactivity of this vaccine.]

The potency of batches of merzonin-inactivated vaccines prepared for the last part of the investigations was generally of a much higher order than that of batches previously prepared, this probably being due to the use of gauze filtration only instead of the previously employed centrifugation.

C. Klimt

PLAGUE

HOPKINS, G. H. E. **Report on Rats, Fleas and Plague in Uganda.** 52 pp., 2 folding maps. [23 refs.] 1949. East African Standard Ltd. for the Govt. Printer of Uganda.

The period covered by this report is from 1930 to 1946. The information obtained on the surveys is discussed under 14 district headings and summarized in 23 tables. Some notes on the history of plague in Uganda are followed by a brief description of the geographical distribution of the disease illustrated by a map showing its relation to rainfall. There is no evidence of sylvatic plague in Uganda. An account is given of some of the animals examined including *Rattus rattus*, *R. coucha ugandae*, field rats of the genus *Arvicanthis*, gerbils and squirrels ; a map shows the distribution of *R. rattus* in Uganda in 1921 and 1938

Rattus rattus appears to have entered Uganda between 1901 and 1906. Before that time *R. coucha* must have been the common hut-rat and indeed it is still abundant in huts in areas where *R. rattus* has not penetrated. But where *R. rattus* is present in numbers, *R. coucha* has been forced to become a field rat. The other field rats rarely enter houses, though *Arvicanthis* may forage in them but does not dwell there.

The fleas encountered included *Xenopsylla cheopis*, *X. brasiliensis*, *X. nubicus*, *Dinopsyllus lypusus*, *Ctenophthalmus cabirus* and *Ctenocephalides strongylus*. The plague vectors are the first two named ; there is no adequate evidence against the others.

The most interesting fact about the fleas is their geographical distribution into two zones. In the northern zone *Xenopsylla cheopis* occurs on both field and house-haunting rats ; *X. brasiliensis* is rare. In the southern zone *X. cheopis* is mainly restricted to *R. rattus* in buildings in townships, *X. brasiliensis* is abundant on hut rats and neither is frequent on field rats.

Outbreaks of plague almost always begin in rural areas and *X. brasiliensis* is thus the most important plague flea in Uganda. *X. cheopis* keeps the infection going when a township is affected though in all areas examined either or both fleas infest rats from human dwellings in sufficient numbers to maintain an outbreak when it occurs. *H. S. Leeson*

Ghosh, P. K. **An Outbreak of Plague in an Epidemic Form treated with Streptomycin and Sulfadiazine.** *Indian Med. Gaz.* 1950, Oct., v. 85, No. 10, 441–5.

During an epidemic of plague in the United Provinces, India, in 1949–1950, the author treated 155 cases with one to four injections of 0·5 gm. streptomycin ; when repeated, the interval between injections was 12 hours. Defervescence always occurred after two doses and the patients usually refused to accept further injections. A few patients recovered after a single injection. There were only 6 deaths ; 5 of these occurred among patients admitted in a moribund state.

Sulphadiazine, in doses of 1·0 gm., was given when available, but no details are supplied with regard to the number of doses or the number of the patients who received the drug. *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Gazette Médicale de France. 1950, v. 57, Nos. 16 & 17, 725–846 ; 847–886. Congrès International de l'amibiase et de l'ensemble des parasitoses intestinales de l'adulte et de l'enfant, Châtelguyon 15 et 16 septembre, 1950. [**International Congress of Amoebiasis and Intestinal Parasitic Infections in Adults and Children, Châtelguyon 15 & 16 September, 1950.**]

The two issues of this journal are devoted exclusively to the proceedings of the Congress of Amoebiasis held in September 1950 at Châtelguyon, one of the most famous spas of the Auvergne.

In an opening address, C. Mathis (p. 731) gives a general account of amoebiasis, with special reference to the host-parasite relations, pathogenesis and treatment of this disease. He believes in the existence of a commensal ("*tetragena*") phase of the amoeba, which gives rise to symptomless infection, while the clinical phase takes the form of dysentery which may be succeeded by bacterial enterocolitis. According to this author, *E. histolytica* is strictly host-specific, being incapable of completing its development in other hosts. [However, it is well

known that in experimentally infected monkeys and rats this amoeba encysts normally.] J. BAUMEL and E. FASSIO (p. 735) deal with the clinical aspects of intestinal amoebiasis, including sigmoidoscopical and radiological examination of the large bowel. P. HILLEMAND and R. CATTAN (p. 743) state that in France amoebiasis is not only imported from the colonies but also occurs among the local population, who rarely manifest dysenteric symptoms but suffer from vague intestinal disorders (" *amibiase camouflée* "), the diagnosis of which is based only on the detection of the amoebae in the stools. The same ground is covered by J. LEBON *et al.* (p. 749) in a paper on non-dysenteric forms of amoebiasis observed in North Africa. A communication by Ch. SARROUY and F. GILLOT (p. 753) describes various aspects of infantile amoebiasis. Its incidence within the French possessions is variable : while it is high in tropical and subtropical endemic areas, such as Indo-China, French West and Equatorial Africa, it is low in the temperate zone, being restricted to foci in the Mediterranean basin. Three papers are devoted to amoebic infection of the liver : M. PAYET (p. 763) deals with the clinical aspects of hepatitis, M. CHIRAY and P. CHENE (p. 771) with elusive forms of hepatitis, and its differential diagnosis, while R. de GRAILLY and G. F. MORETTI (p. 775) describe its pathological anatomy. PIERI (p. 783), in a paper on amoebiasis and giardiasis, maintains that the latter is frequently an aggravating factor in the former disease. Referring to the treatment of giardiasis, he comments on the toxicity of quinacrine [mepacrine] and the powerful action of nivaquine, though the latter is not regarded as highly specific. M. F. MOUTIER (p. 791) notes the co-existence of amoebiasis and cancer of the colon. Amoebic lesions of the rectum and their detection by rectoscopy form the subject of a paper by MOLINIER *et al.* (p. 795), while some extra-intestinal forms of amoebiasis are considered by M. RIOU and E. ARQUIÉ (p. 801).

In the section on therapy, there are two papers on conessine. R. CROSNIER (p. 805) regards it as the most efficacious drug against all forms of amoebiasis, which can be safely employed if accompanied by intravenous injections of calcium and by oral administration of phenergan. However, F. BLANC and F. SIGUIER (p. 817) are more cautious in their appraisal of this remedy, which they recommend chiefly when the use of emetine is contraindicated, or in prolonged treatment—to follow a course of emetine or aureomycin. In the biological section. Ch. GARIN and J. COUDRET (p. 825) give a review of the methods of cultivation of *E. histolytica* ; R. DESCHIENS (p. 829) deals with the bionomics of this parasite, including its life-cycle, factors affecting its development, its host-parasite relations, the viability of the amoeba and its cysts *in vitro*, and the effect of drugs upon it ; C. W. REES (p. 835) discusses the metabolism of *E. histolytica* and its relation to clinical problems of amoebiasis. The last paper devoted to amoebiasis is by R. DUJARRIC DE LA RIVIÈRE (p. 843) who deals with its epidemiology.

The remaining communications concern other intestinal parasitic infections. G. LAVIER (p. 853) describes the infections due to liver flukes : an account of their distribution, classification and life-history, is followed by observations on the symptomatology, clinical forms, diagnosis and treatment of the infections. F. COUTELEN (p. 857) reports the results of a very thorough parasitological survey among children of school age in northern France, comprising repeated examinations of 5,338 children, between the ages of two and six, attending kindergartens, and 844 older children. In the first group up to 73 per cent. were found to be symptomless carriers of pathogenic protozoa and helminths, which are listed. In the second, among children in institutions, the incidence of intestinal parasites—especially *Ascaris* and *Trichuris*—was still higher. It is noted that *E. histolytica* was absent in the children examined. Finally, the author deals with the epidemiological conclusions of the survey. In one paper, BECMEUR *et al.* (p. 869) deal with ankylostomiasis among phosphate

miners in Morocco, while in another (p. 875) they record the incidence of intestinal parasites in general among the native population of Morocco. L. J. D. Rodriguez (p. 881) describes enterobiasis in Ecuador and, finally, J. H. Dumont (p. 885) contributes a note on *Ascaris*, "*un parasite trop oublié*".

C. A. Hoare

Lancaster, H. O. **The Theory of Amoebic Surveys.** *J. Hygiene.* 1950, Sept., v. 48, No. 3, 257–76, 1 fig. [12 refs.]

If a number of people are examined for the presence of some parasite, the probability that the parasite is detected (the "demonstrability") is likely to vary from person to person. No upper limit can be placed on the number of carriers in the population, for some people may have very low demonstrability and will almost certainly go undetected. A lower limit may, however, be set. Suppose that at a first examination X_1 carriers are detected out of N people, and at a second examination of the remaining $N-X_1$ people X_2 carriers are detected. Then, apart from sampling fluctuations, the number of carriers in the population of N is greater than $X_1^2/(X_1-X_2)$. A similar result is available when all the members of the population are repeatedly examined. Various mathematical models for the distribution of demonstrability are studied. In a survey carried out by the first method (where any positives found are not examined further), the adequacy of any estimate of the number of carriers may be judged by the requirement that the estimated mean demonstrability of the outstanding carriers after successive examinations should form a decreasing sequence. This consideration shows that the usual methods of estimating the carrier rate give too low a value.

P. Armitage

Elsdon-Dew, R. **Amoebic Dysentery in Southern Africa. A Comparison of Durban and Lourenço Marques.** *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 223–37, 4 diagrams, 1 folding chart & 6 coloured figs. on pl. [30 refs.]

This is a lecture delivered during a visit to Lourenço Marques. After discussing the nomenclature of the parasite causing amoebic dysentery the author stresses the difficulties in recognition and differentiation of the various amoebae and cysts occurring in human stools.

He regards the size, character, and position of the karyosome in the nucleus as the most reliable characteristic in the differentiation of these parasites. He discusses the methods of infection with *Entamoeba histolytica*, and gives an account of amoebiasis and amoebic dysentery as it has recently been encountered in Durban. The position is contrasted with that in Lourenço Marques, and the opinion is expressed that the conditions of hygiene in the latter city are infinitely superior to those in Durban.

In a lengthy table are set out the results of treatment of fulminating cases of amoebic dysentery in Durban with a large number of drugs administered either alone or in combination ; the statement is made that the results in the few cases treated with aureomycin were almost miraculous, but that further study is necessary before any proper assessment of its value can be made. [See also this *Bulletin*, 1950, v. 47, 538.]

A. R. D. Adams

Wijerama, E. M. **"Amoebiasis"—a Public Health Problem.** *J. Ceylon Branch Brit. Med. Ass.* 1950, Mar., v. 45, No. 1, 15–19.

Examination of 3 consecutive stools from 334 patients admitted to hospital in Ceylon for a variety of conditions showed that 88 (26·5 per cent.) harboured *Entamoeba histolytica* infections. Of the 88 patients 27 (30·7 per cent.) suffered

from symptoms referable to the infection. Clinically patent amoebiasis accounted for nearly 5 per cent. of all hospital admissions between 1943 and 1947 ; this figure is double that of the admissions for enteric in the same period. The mortality from amoebiasis in this period in the author's wards ranged from 12·2 per cent. of diagnosed cases in 1943 to 2·6 per cent. in 1947. The prevention of amoebiasis lies in (1) proper sanitation, (2) treatment of cyst-passers, (3) protection of drink and food from pollution, (4) destruction of house-flies, and (5) education of the public. There are suggestions for the achievement of these.

A. R. D. Adams

WILSON, I. S. **A Review of Chronic Amoebiasis in Returned Service Personnel.** *New Zealand Med. J.* 1950, Oct., v. 49, No. 273, 501–7.

One hundred and forty-six men and two women, all having served abroad, were found in New Zealand to be suffering from amoebiasis between April 1946 and September 1949. Only 22 of these had been diagnosed and treated as cases of amoebiasis overseas. Parasites were recovered from 133; in the others the diagnosis " was confirmed by the therapeutic test ". Seventeen suffered from an amoebic hepatitis, the diagnosis resting on " the therapeutic test " ; in only 7 of these were parasites recovered from stools. Three had amoebic liver abscesses. After treatment 44 of the patients were cured ; 83 were much improved or slightly improved ; and 21 were not improved, though the cause of their persistent troubles was not ascribable to their persistent amoebic infections. The average duration of treatment of the patients cured was 15 months.

In a footnote MACLEAN, the Director of the Division of Public Health, points out the freedom New Zealand enjoyed from amoebic dysentery before the war, and the present potential dangers of its becoming endemic as a result of its importation since. Steps are being taken to keep abreast of the discovery of new cases.

A. R. D. Adams

KOHN, J. **A Rapid Laboratory Method for the Diagnosis of Intestinal Protozoa in Faeces.** *J. Trop. Med. & Hyg.* 1950, Nov., v. 53, No. 11, 212–14, 5 figs.

For routine diagnosis, a rapid and simple staining method for the identification of intestinal protozoa is highly desirable, especially since some of the methods in common use (*e.g.*, iodine stains) are not satisfactory. The method described in this paper serves to fix the parasites and at the same time to reveal in them structural details of diagnostic value. One of the following two reagents is used : (1) Phenol liquefactum 1 ml., glacial acetic acid 0·6 ml., aq. dest. 50 ml., or (2) Phenol liquefactum 0·9 ml., aq. dest. 50 ml. The first solution is used for cysts in formed faeces, while the second is used for the examination of fluid faeces containing the active protozoa. In all cases, a saline faecal preparation is first examined, to decide which reagent should be employed. The final preparation is made by placing 2–3 drops of the reagent on a slide and teasing-up a loopful of faeces, after which a coverslip is applied, and the slide is ready for examination. It can also be kept without deterioration for periods up to 3 months, if the coverslip is sealed with nail varnish.

When treated with one of these reagents, the structure of the protozoa is revealed owing to an alteration of the refractive index of the various cell constituents. When examined under low power, the cysts and active forms stand out as shining discs. They can usually be identified under a $\frac{1}{6}$-inch objective, but for finer structural details an oil immersion lens should be used. In the case of *Entamoeba histolytica*, the preparation reveals not only essential details of nuclear structure but also the chromatoid bodies, which are not

seen in iodine preparations. This method also shows the characteristic features of other amoebae and of flagellates, both free and encysted.

In addition to the simplicity and rapidity of this method when used for immediate examination, the first reagent can be employed for the preservation of faeces in bulk, *e.g.*, for sending specimens by post. Cysts in preserved specimens can be identified after a fortnight. *C. A. Hoare*

URSO, B. Il quadro coprologico dell'amebiasi acuta e cronica. [**The Faeces in Acute and Chronic Amoebiasis.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Oct., v. 31, No. 10, 729–32.

Urso and his colleagues have examined 20,000 specimens of faeces in the laboratory of the Tropical Diseases Hospital in Rome over a period of 13 years. The specimens came from out-patients as well as in-patients. *Entamoeba histolytica* was found in 4·22 per cent. of these examinations, but a diagnosis of amoebic dysentery should not be excluded because the parasite has not been seen in the faeces. The author has seen cases in which the parasite disappeared from the faeces after having been found there and has re-appeared after repeating a saline on three successive days. If a careful history is taken, so-called healthy carriers will always be found to have had, perhaps slight, diarrhoeal episodes : " latent amoebiasis " is a better term to use for such cases. In the faeces of amoebic dysentery there are more red blood corpuscles than leucocytes : the converse is usually seen in the faeces of bacillary dysentery, where the leucocytes predominate over the red cells. Chronic forms of amoebic dysentery are not infrequently met with in temperate countries, in which periods of constipation alternate with diarrhoea ; the latter usually occurs in the summer months and the faeces may then contain the vegetative form of *Entamoeba histolytica* together with undigested muscular fibres, fatty acid crystals and neutral fat globules. The hard stools of the periods of constipation may be mixed with soft material in which the typical cysts of *Entamoeba histolytica* may be present often together with triple phosphate crystals. *Giardia intestinalis* has been found associated with the *Entamoeba* in 10 per cent. of cases and Castellani has called it a " pilot parasite ". *J. Cauchi*

TRIPODI, P. Comportamento dell'acidità gastrica ed esame radiologico del tratto gastroduodenale in casi di amebiasi intestinale cronica. [**Gastric Acidity and Radiological Findings in the Stomach and Duodenum in Chronic Intestinal Amoebiasis.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Dec., v. 31, No. 12, 883–90. [21 refs.] French summary (4 lines).

Reports on the gastric acidity in patients with chronic amoebiasis of the intestine have varied, but the majority have indicated a tendency to a lowering. The author has studied 20 cases in this regard and also the radiological appearances after a test-meal. Extraction of the gastric juice was made early before any food had been taken and again every half-hour for 4 extractions after intramuscular injection of 1 cc. of 1 per cent. histamine hydrochloride. He found achlorhydria in two and in these no radiological changes were noticeable ; in 5 there was hypochlorhydria and in one of these there were indications of a duodenal ulcer and in one a gastro-duodenitis ; in another 5 the acidity was normal and one of these showed radiological evidence of periduodenitis ; 8 had hyperchlorhydria and 4 of these had a duodenal ulcer. [The author's results, therefore, do not throw much additional light on the question.]

H. Harold Scott

DERIU, G. & PIRASTU, C. La funzionalità della vescichetta biliare nell'amebiasi cronica. [**The Effect of Intestinal Amoebiasis on Gall-bladder Function.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Dec., v. 31, No. 12, 891–902, 12 figs.

The author divides his 18 patients into two groups : one with intestinal symptoms only, the other with signs of liver disturbance also. Six cases are described in some detail, with a series of X-ray pictures. These are not very clear but would seem to indicate that patients with chronic or inadequately treated amoebiasis of the intestine exhibit a reflex hyper-excitability of the alimentary canal and of the gall-bladder, due to a single cause, anatomical changes in the intestinal mucosa. Cholecystography is, therefore, important in conditions of intestinal amoebiasis as indicating functional changes in the liver. *H. Harold Scott*

KLEINOT, S. **Amoebiasis : Difficulties and Pitfalls in the Diagnosis. A Case of Lymphatic Spread in a Bantu Male.** *South African Med. J.* 1950, Dec. 9, v. 24, No. 49, 1017–19, 2 figs.

The surgical complications of amoebiasis, other than liver abscess, have received scant attention in the textbooks, although they may simulate haemorrhoids, carcinoma of the rectum, tuberculous enteritis, cholecystitis, ascending pylephlebitis or perforated peptic ulcer, to mention only the most important. In all these conditions the mode of spread of the disease is by the blood stream or by direct extension. The author reports a case in which invasion of the lymphatics occurred. A Bantu male was admitted as a case of chronic alcoholism ; he gave a history of constipation, but passed a diarrhoeic stool soon after admission. Later in the day he complained of severe epigastric pain and when examined was found to be collapsed, with tender, rigid abdomen and all the signs of an acute abdominal catastrophe. Laparotomy was carried out under local anaesthesia and the peritoneal cavity was found to contain blood-stained fluid with no faecal odour and there was no ruptured viscus. The small bowel appeared normal, but the large bowel was swollen, with congested vessels and fibrinous exudate on its serous surface ; it felt rigid and solid in its ascending and transverse portions and in the first inch or two of the descending portion, at which point it abruptly became normal in appearance. The mesenteric lymph glands in relation to the proximal colon were enlarged and fleshy ; the liver and spleen appeared normal. A diagnosis of Crohn's disease was made and, as the patient's condition was bad, the abdomen was closed. The patient died on the following day and at autopsy the caecum and colon were found to show extensive necrosis with ulceration, which involved the entire diameter of the bowel, with abrupt change to normal at the commencement of the descending colon. Histological examination revealed the presence of *E. histolytica* in the lymphatics of the bowel wall and in the related lymph glands. The unusual invasion of the lymphatics tended to produce a transverse spread in the bowel wall, not unlike that which occurs in tuberculosis. Invasion of the lymphatics by the amoebae would account for the apparently inflammatory colonic tumour seen at operation and mistaken for the acute form of Crohn's disease. Although Crohn described his disease as " regional ileitis ", it is now known that almost any part of the gastro-intestinal tract may be involved. *W. L. Harnett*

JACOBSON, J. N. & MADDEN, P. C. W. **Amoebiasis causing Intestinal Obstruction.** *South African Med. J.* 1951, Jan. 20, v. 25, No. 3, 42–4, 5 figs.

An account of a case.

AYAS, E. & CARLOS ARAUZ, J. Complicaciones endotorácicas de la amibiasis. [**Intrathoracic Complications of Amoebiasis.**] *Prensa Méd. Argentina.* 1950, Oct. 13, v. 37, No. 41, 2450–55, 9 figs.

HUARD, P. Les abcès du foie au Vietnam. [**Liver Abscess at Vietnam.**] *Méd. Trop.* Marseilles. 1950, July–Aug., v. 10, No. 4, 613–22. [26 refs.]

The history of liver abscess in various parts of Vietnam is reviewed from 1863 to a recent date. In the early part of this period the incidence of the disease was high, and the mortality from it was very considerable.

With the discovery of a specific treatment for amoebic dysentery and for amoebic liver abscess both the morbidity and the mortality due to the latter progressively fell, and by 1945 they had become insignificant. Between 1945 and 1949 liver abscess again rose in incidence as a result of military activities ; but the mortality from it did not revert to its previous high figure. Various forms of abscess of the liver are recorded and the view is restated [this *Bulletin*, 1936, v. 33, 536] that the aetiology of liver abscess is complicated by a number of factors other than the simple one of amoebic infection of the gut.

A. R. D. Adams

ANDERSON, H. H. & HANSEN, E. L. **The Chemotherapy of Amebiasis.** *Pharmacol. Rev.* 1950, v. 2, No. 3, 399–434, 1 fig. [110 refs.] (appearing as Pt. 2 of Dec. 1950 *J. Pharmacol. & Exper. Therap.*).

This is an informative and well documented review of the present position of the chemotherapy of amoebiasis by authors who have made considerable contributions to the subject. All too frequently, as they point out, the testing of amoebicidal agents has developed as an offshoot of some other research programme, and the number of chemical types so far investigated is limited. Of the substances obtained from plants, and even among synthetic substances, emetine has remained pre-eminent but suffers from several limitations as a chemotherapeutic agent. This alkaloid has served as the model on which syntheses of potential amoebicides were based in a number of investigations but no marked success in production of an active analogue has been recorded. Other synthetic substances widely used are tri- and pentavalent arsenicals, halogenated oxyquinolines and chloroquine (a 4-aminoquinoline). A number of antibiotics have also been tried clinically. Because of the different situations in which *E. histolytica* may be encountered it is suggested that a series of different drugs with suitable distributions and sufficiently high blood levels may always be required for successful treatment. Apart from macaques, an entirely suitable laboratory animal for *in vivo* tests of new drugs is not available. The value of these animals in preliminary testing is stressed in a later section. For *in vitro* tests it is essential that results should indicate clearly whether the action of a substance is direct or indirect. The method described by BRADIN & HANSEN [this *Bulletin*, 1950, v. 47, 538] appears to be of value in this respect, but that devised by DOBELL [this *Bulletin*, 1948, v. 45, 518] receives no mention in this connexion. The results of such tests must be considered in conjunction with data on toxicity and distribution in the organs before clinical trial is undertaken. Tests carried out *in vitro* have indicated that a wide range of compounds is active against *E. histolytica* but their mode of action is unknown. An accurate knowledge of the cultural and metabolic requirements of *E. histolytica* would doubtless pave the way for farther advances in the subject. Useful tables with chemical formulae indicate the type of substances found active in various tests.

[The formula given for emetine is not the correct one put forward by ROBINSON (*Nature*, 1948, Oct. 2, 524) and since confirmed. Gavano, queried as a derivative of cephaeline is in fact a substituted diphenyl ether.]

J. D. Fulton

SIGUIER, F., CHOUBRAC, PIETTE, M. & HERMAN, J. L'auréomycine dans le traitement de l'amibiase intestinale aiguë, évolutive. [**Aureomycin in the Treatment of Acute Amoebic Dysentery.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1950, Nos. 25/26, 1363–8.

This is a preliminary report on the treatment with aureomycin of 40 patients suffering from acute or relapsing amoebic dysentery. The dosage given was 1·5 to 2·0 gm. of the drug on the first day ; on the second and subsequent days 3 gm., divided into 4 doses, were given ; treatment was continued for from 7 to 10 days ; the total dosage, therefore, was from 20 to 30 gm. The drug was well tolerated, though two patients complained of nausea and one of colic. Aureomycin treatment proved effective in arresting acute attacks of amoebic dysentery in 3 or 4 days in 80 per cent. of the cases ; parasites disappeared from the stools, and there was healing of the rectal lesions within a week. In this the drug proved as effective as emetine ; it was much better tolerated than is conessine. Unfortunately, though the immediate clinical results of treatment were good, there was a high proportion of subsequent relapses ; the drug therefore proved no better in ensuring sterilization than any other of the treatments advocated for acute attacks of dysentery. When given alone initially it should subsequently be followed by prolonged courses of treatment with the older and accepted amoebicides. In view of its prompt action, its lack of toxicity, and the ease with which it can be given by the mouth, aureomycin should supplant the antibiotics previously used in the treatment of amoebiasis.

BERTRAND-FONTAINE stated that results obtained by her have been comparable to those outlined above. The rapidity of action of aureomycin and the ease with which it could be given made it of the greatest value in the treatment of intestinal amoebiasis, but the drug alone would not ensure sterilization of the infection. Subsequent treatment over several months with the accepted drugs is necessary to ensure cure and sterilization of the parasitic infection in most cases.

A. R. D. Adams

THIODET, J., BUTORI, P., FOURRIER, A. & MASSONNAT, J. Abcès amibiens du foie guéris sans intervention chirurgicale. Les indications de l'émétine et l'auréomycine. [**Cure of Amoebic Abscesses without Surgical Intervention. The Indications for Emetine and Aureomycin.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1951, Nos. 31/32, 1648–50.

Three patients with amoebic liver abscesses were successfully treated with emetine. Two of the abscesses had invaded the lung ; one of these was secondarily infected with bacteria, but it resolved under emetine and aureomycin treatment and aspiration.

A. R. D. Adams

BASNUEVO, J. G. & GUTIÉRREZ ESTARLÍ, E. **Chloroquine for Amoebic Liver Abscess.** *Rev. Kuba Med. Trop. y Parasit.* 1950, May–June, v. 6, Nos. 5/6, 74–6. [29 refs.]

Eight patients with amoebic liver abscesses in Cuba were treated with chloroquine. Some at least of them had been opened surgically ; in 5 of the 8 cases typical parasites had been found in the matter obtained from the liver

lesions. The total dosages of chloroquine used ranged from 12½ to 15 gm. in all but one patient; this man died shortly after treatment was begun. The remaining 7 patients were cured of their amoebic liver infection by the chloroquine treatment. *A. R. D. Adams*

CHANG, S. L. **Kinetics in the Thermodestruction of Cysts of *Endamoeba histolytica* in Water.** *Amer. J. Hyg.* 1950, July, v. 52, No. 1, 82–90, 2 figs.

A linear relation is found between the reciprocal of the absolute temperature to which a fixed number of cysts are subjected, and the contact time required to kill the cysts (as judged by the result of culture in a bacteria-seeded medium). More precisely, the contact time may be regarded as the time required to reduce the population of live cysts to some small number which would be expected to include no mature cysts. This linear relationship would be expected from kinetic considerations, and the energy of activation for the thermodestruction of cysts is estimated at 134,000 calories. At a fixed temperature the killing time is linearly related to the logarithm of the total inoculum, a result to be expected if the population of live cysts is subject to a constant death rate. The author's conclusions are also confirmed by the data of JONES and NEWTON [this *Bulletin*, 1950, v. 47, 624]. The destruction of amoebic cysts in water and on vegetables may be effected by heating the water to 50°C. for 30 minutes. *P. Armitage*

BÖTTNER, H. Lambliosis, Biologie und Klinik. [**Giardiasis: Biological and Clinical Aspects.**] *Med. Klin.* 1950, Aug. 18, v. 45, No. 33, 1015–22, 1 fig. [Numerous refs.]

In this paper the author expresses his views on the parasitological and clinical aspects of giardiasis, based on literary data and personal observations. A description is first given of *Giardia intestinalis* in its active and cystic stages, and of the method for detecting the parasite in the duodenal and faecal contents. The author then turns to its transmission and incidence. He points out that the human *Giardia* is cosmopolitan, and reckons (from the results of the examination of 38,686 persons published up to 1934 by 60 authors) that its incidence throughout the world is 12·5 per cent. The incidence of infection between 1935 and 1948 among diverse groups of people in different countries is given in tabular form. These data again confirm the world-wide distribution of *Giardia*, and show that the incidence of infection is highest among children, especially between the ages of 2 and 10 years. In adults infections were naturally more prevalent among groups in institutions, such as barracks, asylums and hospitals, and among persons suffering from intestinal disorders and jaundice. A survey carried out by the author and his associates in Marburg revealed 30 cases of giardial infection in 618 persons, distributed as follows: 20 (3·8 per cent.) in 518 adults and 10 (10 per cent.) in 100 children. Although it is admitted that in the great majority of cases infection with *Giardia* is symptomless, the author has no doubts about the pathogenicity of this flagellate. Apparently its multiplication and virulence are favoured by an alkaline reaction of the medium, whereas an acid reaction is detrimental to it. This view is supported by observations that heavy infection with intestinal disorder is commonly associated with achylia gastrica and a diet rich in carbohydrates, whereas a protein diet inhibits the growth of the parasites. The author thinks that, by attaching themselves in large numbers to the mucous membrane, these flagellates exert a mechanical and toxic action, and interfere with absorption, thereby causing functional disturbances and manifestations of disease. He also believes that *Giardia* may penetrate into the gall bladder,

though the finding of the flagellates in this site has been reported only three times. The disease due to this flagellate is said to be represented by two forms : (1) the intestinal form, manifested by enterocolitis with dyspepsia and diarrhoea, and (2) the hepatic form, with symptoms of cholecystitis. A clinical description is given of two cases of the intestinal form of giardiasis. For medicinal treatment the author recommends atebrin [mepacrine] or—in cases of atebrin-fastness—acranil. The condition also improves considerably if the patient is put on a pure meat diet. As regards prophylactic measures, these are the same as in any faecally transmitted protozoal or bacterial diseases of the intestine.

[Though in the foregoing account the Diplomonadine flagellate is referred to as *Giardia intestinalis*, the author himself calls it *Lamblia intestinalis*, while in U.S.A. the name *Giardia lamblia* is more commonly used. In view of the existing confusion, the nomenclature of this parasite stands in need of elucidation. There can be no doubt about its generic status : since *Giardia* was created by KUNSTLER in 1882 and *Lamblia* was named by BLANCHARD in 1888, the genus *Giardia* has priority and is the only valid one. However, opinions regarding the correct specific name for the human *Giardia* are divided, for the following reasons : LAMBL (1859) named it *Cercomonas intestinalis*, but previously (1850) DIESING renamed the frog flagellate *Bodo intestinalis* created by EHRENBERG (1838), calling it *Cercomonas intestinalis*. There were thus two organisms bearing the same name : (1) *Cercomonas intestinalis* (Ehrenberg, 1838) Diesing, 1850, for the frog flagellate, and (2) *Cercomonas intestinalis* Lambl, 1859, for the human flagellate. When ALEXEIEFF (1914) transferred the human flagellate to the genus *Giardia*, it retained Lambl's specific name *intestinalis*. But later KOFOID and CHRISTIANSEN (1915) pointed out that *intestinalis* was preoccupied by the frog flagellate and was therefore not available for the one from man. They accordingly gave it the new specific name *lamblia*, and it became *Giardia lamblia*. However, already in 1909 DOBELL showed that Ehrenberg's *Bodo intestinalis* was not a *Cercomonas* at all but a *Hexamita*, therefore since the specific name *intestinalis* actually belonged to different genera, it was available for the human *Giardia*, and should (by priority) be retained in preference to the specific name *lamblia*. There is another objection to the name *G. lamblia*, noted by Dobell (1940) : " Kofoid and Christiansen imply that it was proposed in a private letter to them from Stiles, while Stiles declares that he " has no record of this letter " (*cf.* Boeck and Stiles, 1923, p. 178)." In view of these facts, the correct name for the flagellate in question is *Giardia intestinalis* (Lambl, 1859) Alexeieff, 1914.]

C. A. Hoare

BASNUEVO, J. G. La quinacrina y los nuevos antimaláricos en el tratamiento de la Giardiasis. [**Mepacrine and New Antimalarials in the Treatment of Giardiasis.**] *Rev. Kuba Med. Trop. y Parasit.* 1950, Sept.–Oct., v. 6, Nos. 9/10, 121–3. [15 refs.]

The English summary appended to the paper is as follows :—

" The author refers to the use of Quinacrine and the new antimalarial drugs in the treatment of Giardiasis.

" The author groups the giardicides in the following order, according to their effectiveness :

" 1. Atebrine or Ayasol 90%
2. Chloroquine 75%
3. Chloroguanide hydrochlorate 50%
4. Stovarsol 40%
5. STB 40%
6. Carbarsone ... ... 30% "

Agosín, M., Christen, R. & Rubio, Mafalda. Acción de la Terramicina sobre el *Balantidium coli*. I. Estudio "in vitro". [**Action of Terramycin on** *Balantidium coli in vitro*.] *Bol. Informaciones Parasitarias Chilenas*. 1950, Oct.–Dec., v. 5, No. 4, 42–3.

The English summary appended to the paper is as follows :—

"The authors, testing the action of Terramycin upon the development and multiplication of *Balantidium coli*, "in vitro", find a very unfavourable effect when applied in the given dosage.

"This action seems to be direct upon the protozoa and not by modifications of the associated bacterial flora."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Phipps, J. *Ornithodoros moubata* **Murray in Tanganyika.** *East African Med. J.* 1950, Dec., v. 27, No. 12, 475–82, 1 fig.

This paper describes an investigation of the degree of infestation of houses by *Ornithodorus moubata* in different parts of Tanganyika, the investigation was confined to villages up to five miles outside the main townships, where the population was more or less static. Samples of the tick population in houses were made by passing earth from four separate square feet of floor through a sieve and counting all the ticks in the sieve. In some cases two such groups of four samples were taken with consistent results.

In the environs of townships thus studied, 47 per cent. of all houses were uninfested. In about 15 per cent. only one of the four samples contained ticks and in another 15 per cent. all samples contained ticks. The presence or absence of fowls in the huts was not associated either with the presence or absence of ticks, or with the numbers of ticks in infested houses. All the ticks caught in houses were *O. moubata*.

In comparing tick infestations in different parts of Tanganyika the author uses the mean log. (catch +1). There is a good correlation between this figure and the percentage of houses positive in different parts of the country. There is, however, little correlation between mean log. catch and total cases of relapsing fever in 1946. This may be because not all ticks are infected, because not all infected ticks can pass the infection to man, or because of local immunity. In some places (*e.g.* Mwanza) many cases of relapsing fever are recorded but the tick infestation is slight. This may be because only a few ticks are necessary to maintain the infection in man, or may indicate the existence of another vector, perhaps lice. The heaviest infestations with *O. moubata* occur in the central part of Tanganyika, bounded by Shinyanga, Iringa, Tabora and Kilosa on the north, south, west and east respectively. *J. H. Sudd*

Bourgain, M. Résistance au jeune prolongé, d'une durée de 5 années, des nymphes d'*Ornithodorus tholozani* avec persistance de leur pouvoir infectant à *Spirochaeta persica* Dschunkowsky, 1912. [**Resistance of Nymphs of** *Ornithodorus tholozani* **to a Prolonged Fast of Five Years and Persistence of their Infectibility by** *Spirochaeta persica*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 692–3.

The following is a translation of the author's summary :—

Nymphs of *Ornithodorus tholozani* of the 2nd and 3rd moulting, to the number of 50 per cent., resisted a fast of at least 5 years without loss of infectibility. They should therefore be regarded as the principal reservoir of relapsing fever in desert regions. *H. J. O'D. Burke-Gaffney*

Floch, H., Constant, Y. & Destombes, P. Second cas de Sodoku en Guyane Française. [**Second Case of Ratbite Fever in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 209.* 1950, June, 4 pp., 1 fig.

The authors reported one case of ratbite fever from French Guiana [this *Bulletin*, 1951, v. 48, 158] and now report a second from the same household four months later in the daughter of the first patient, a child 2½ years of age who was bitten by a rat on the right ear. As the rat which infected the first patient had been killed this infection was due to a different rat. The wound healed, but 14 days later the scar became painful and swollen. On examination the axillary lymph nodes were not enlarged, there was an enlarged tender epitrochlear node, but except for a raised temperature there were no other signs or symptoms. White mice were inoculated with blood from the patient and the diagnosis of ratbite fever was confirmed by recovery of *Spirillum minus* from their blood.

Streptomycin was administered, 0·5 gm. daily for 8 days, two injections daily at intervals of 12 hours, and was followed by rapid and complete recovery.

P. A. Clearkin

YAWS

Jelliffe, D. B. **Ghoul Hand.** *J. Trop. Med. & Hyg.* 1950, Dec., v. 53, No. 12, 238–40, 2 figs. [13 refs.]

Under this name are described certain vitiliginous keratotic changes seen in the palms of 20 Africans at Ibadan, Nigeria. The patients were mostly male manual workers. The thickened, inelastic skin is smooth or scaly and cracked and its white or yellowish colour may have brown blotches. The mobility of the hands is reduced and contractures of the fingers may be present. This condition develops gradually and is usually symptomless. The Kahn reaction was strongly positive in all cases. Signs of chronic yaws were found in 15 patients and a history of yaws was given by 12. Treatment with neoarsphenamine produced improvement in some cases. The author regards the condition as a manifestation of tertiary yaws. [In the author's list of " Clinical evidence of tertiary yaws " are sabre-tibia and crab yaws. It is a pity that the latter term is used without defining it. It would be interesting to know his evidence for regarding sabre-tibia as due to yaws.] *C. J. Hackett*

i. Montel, L. R., Le Gac, P. & Mulet, M. Essai de traitement du pian par l'huile de chaulmoogra. [**Trials of Chaulmoogra Oil in the Treatment of Yaws.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 681–4.

ii. ——. A propos du traitement du pian par l'huile de chaulmoogra. [**Treatment of Yaws with Chaulmoogra Oil.**] *Ibid.* 685–7.

i. The authors report the results of treating 12 cases of secondary yaws, in Oubangui-Chari, with chaulmoogra oil, extracted from *Taraktogenos kurzii*, neutralized with sodium carbonate and mixed with 10 per cent. guaiacol. The dose was 1 ml. for patients under 7 years of age ; 1·5 ml. 7–10 years ; 2 ml. 10–15 years and 3 ml. for adults, repeated on alternate days for 3–6 doses. Improvement was apparent after the 1st to 4th injection and clinical healing was complete after the 3rd to 6th injection. Further observations and serological data are to be reported later. The authors say that healing of florid

yaws was nearly as rapid as it was after arsenicals or bismuth and pain was relieved more rapidly. Palmar and plantar lesions responded least satisfactorily.

ii. One of the author's assistants, in Indo-China, who was treating lepromatous leprosy with injections of methylene blue, developed an ulcer on the outer side of his right index finger. The author was satisfied that it was a syphilitic chancre ; the patient was convinced that it was leprosy and without any further investigations or delay started treatment with chaulmoogra oil. He received 3 injections of 2 ampoules each week (amount not stated) and the ulcer had completely healed in 10 days but some lymph gland enlargement remained. He received 4–5 series of 20 injections during the next 3 years. Fourteen years after the ulcer appeared his Wassermann reaction was negative. It was this case that suggested the trial of chaulmoogra oil in yaws.

C. J. Hackett

LEPROSY

INDIAN RESEARCH FUND ASSOCIATION. REP. SCIENT. ADVISORY BOARD FOR YEAR 1949, 104–23. **Leprosy.**

D'IGNAZIO, C. Lebbra lebbrosi e lebbrosari in Etiopia. [**Leprosy, Lepers and Leprosaria in Abyssinia.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Oct., v. 31, No. 10, 759–68.

In a style which is somewhat suggestive of a sensational aim, this paper tells of the widespread and uncontrolled movement of open and other cases of leprosy which the Italians found when they occupied Abyssinia. [The picture is quite familiar to those of us who have known African Colonies over the last 25 years.] There is a harrowing account of the native treatment given with some callousness by certain " priest- or saint-doctors." The Sovereign Military Order of the Knights of Malta set up a large leprosy settlement to take 1,000 cases at Sela-Clacá (Tigrai) but this was destroyed in the war-time upheaval. The (American) Sudan Interior Mission [who also run leprosy colonies in Nigeria, British West Africa] had set up a leprosy settlement on a fine site a few miles from Addis Ababa and the Italian Authorities developed this into their " great " leprosy settlement. There were about 400 inmates in 1938–39 and this community had reached 535 by 1947. The structural additions made to the camp have been of temporary materials which are not expected to last and are hardly suitable for the accommodation of patients.

For the children of leprosy patients there is a crèche and nursery about 12 miles away, the " little " leprosarium, which had 32 inmates, aged 5–6 months to 5–6 years by the end of 1947. These children come from all over the country and the institution marks an important preventive step, in that strong traditional parental opposition had to be overcome.

In April, 1941, the Settlement at Harar returned to the charge of the French Mission who had originally set it up.

Leprosy in Abyssinia shows the usual 3 types—cutaneous, neural and mixed. In mixed cases, Wassermann and Kahn reactions were found positive in practically every case ; but syphilitic infection, inherited or acquired, is very widespread. Meinicke's flocculation test is said to have been found negative in most cases. Hansen's bacillus was easily demonstrated in every [? mixed] case. The blood serum was examined in 80 cases for its cholesterin content and this was found markedly raised even when few bacilli could be demonstrated on microscopic examination.

The sign of Le Dantec, which is said to characterize leprosy in white races, is an osteo-periosteal pain elicited on percussion of certain areas over the

humerus, clavicle, sternum and frontal bones. This sign was found to be absent in many Abyssinian leprosy patients and to be present in about 1,500 other Africans who were observed over many years and remained free from leprosy. These included 750 members of the police force, 85 per cent. of whom showed clinical manifestations of syphilitic infection, confirmed by serum tests in 78 per cent.

In the Abyssinian cases, few of the leprosy patches showed anaesthesia.

In over 3,000 without any evidence of leprosy, discoloured skin patches have been tested and found to show little or no pain on pressing with a pin point.

J. Cauchi

JOHANSEN, F. A. & ERICKSON, P. T. **Current Status of Therapy in Leprosy.** *J. Amer. Med. Ass.* 1950, Nov. 18, v. 144, No. 12, 985–9. [16 refs.]

This important paper summarizes work at the Carville Settlement, U.S.A., during nine years and especially progress during the last three years' trial of sulphones and other drugs. The authors agree on the great progress of leprosy treatment with the sulphones and their specially rapid action in clearing lesions of the oral-nasal mucous membrane, in healing ulcers and on their comparatively slow action in destroying lepra bacilli. Relapses have now occurred in 6 of 33 patients followed up for one to five years, and in 45 per cent. in patients for whom sulphone therapy was discontinued. Early eye lesions do well, but not advanced ones. Neuritis may be precipitated by the drugs, but does not result in permanent deformities, so may be considered a sign of favourable prognosis, as is erythema nodosum. After improvement skin lesions may become stationary ; they improve again on a different sulphone. This suggests the combined use of sulphones and dihydrostreptomycin. Laboratory control of the treatment is necessary ; regular periods of rest are required as the sulphones tend to accumulate in the blood. Pushing the dosage does not in crease bacteriological improvement. Relapses occur if sulphones are discontinued. All types benefit but in diffuse lepromatous and also in tuberculoid cases small doses should be given. Reactions such as erythema nodosum although they are of good prognosis, require lower dosage and also antimony treatment. Acute neuritis of large trunks requires discontinuance of sulphones and the injection around the affected nerves of 6 per cent. procaine hydrochloride. The slow reduction of the lepra bacilli indicates search for antibiotics such as are used in tuberculosis. Promacetin orally in maximum doses of 4 gm. and average doses of 2 to 3 gm. daily are well tolerated and beneficial. Streptomycin intramuscularly in 1 gm. doses daily is a useful adjunct. Aureomycin has been given daily in 1 to 1·5 gm. doses for a year in a few cases with invariable healing of mucous membrane and skin lesions ; gastric intolerance occurs but responds to lower dosage or the use of dramamine. Amithiozone has exerted early beneficial effects in a few cases and appears to be very promising, with healing in one month of mouth lesions on a daily dose of 200 mgm. Para-aminosalicylic acid may be beneficial in some cases ; further experience is necessary.

L. Rogers

DE SOUZA-ARAUJO, H. C. Lepra murina. Nova série de pesquisas feitas com o bacílo de Stefansky, amostra do Instituto Pasteur de Paris. Quatro amostras de culturas de bacílos ácido-álcool resistentes isoladas de ratos brancos e camondongos pretos inoculados com esse material. [**Murine Leprosy. Investigations with Stefansky's Bacillus.**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 113–23, 13 figs.

The author obtained a culture of Stefansky's organism from Paris and used it for experiments on white rats and camondongos. Photographs of the animals

after inoculation and photomicrographs of the histological lesions produced show, as well as unstained illustrations can, the effects, and also tubes of the cultures obtained from the lesions in his experimental animals. With these cultures he inoculated other animals successfully and showed that gland lesions were common in the less sensitive rat and the musculo-cutaneous lesions in the more sensitive camondongo. The rat cultures were chromogenic. For the gradual development of the lesions as shown by the intervals between the inoculation and examination of the tissues the original paper should be consulted. *H. Harold Scott*

Erratum

In the abstract of a letter by Lowe in this *Bulletin*, 1950, v. 47, 1001, line 8, the word " tuberculosis " has been printed in error for " tuberculoid."

HELMINTHIASIS

Brown, M., Green, J. E., Boag, T. J. & Kuitunen-Ekbaum, E. **Parasitic Infections in the Eskimos at Igloolik, N.W.T.** *Canadian J. Pub. Health.* 1950, Dec., v. 41, No. 12, 508–12.

The authors present the results of a parasitological investigation which formed part of a medical survey made in 1949 of a group of Eskimos at Igloolik in the North-West Territories of Canada. These Eskimos live a more primitive life than those on Southampton Island, where previous studies had been made by the authors [this *Bulletin*, 1949, v. 46, 376 ; 1950, v. 47, 558].

Examinations were made by NIH swabs of 40 males and of 20 females : the latter were all children under 14 years. Only one swab was taken from each person. Ova of *Enterobius vermicularis* were found in 4 females and 16 males. The subjects come from 23 families : of 17 families where more than one member was examined, only 5 families were negative. Ova were found in the faeces of one of the men with a positive swab and in the faeces of two adult females who were not swabbed.

Faeces from 97 persons were preserved in formalin and examined a few weeks later. The subjects came from 37 families and in 25 cases, more than one member of a family was examined. Ova of *Diphyllobothrium* were found in 32 : of these, 22 came from 9 families where more than one member was infected. *Endolimax nana* was found in 4 specimens and 3 of these also contained *Entamoeba coli*. *Giardia* was found in 2 specimens and Charcot-Leyden crystals in 2.

In 82 subjects, differential blood counts were done. Eosinophiles varied from 0 to 55 per cent. with an average of 5·7 per cent. : it was more than 5 per cent. in 33 cases. In 21 cases giving a positive precipitin test with *Trichinella* antigen, the eosinophiles averaged 8 per cent. : in 56 with negative precipitin tests, the average was 4·01 per cent. (It is added that in the case of those with positive precipitin tests, the omission of the subject having 55 per cent. eosinophiles reduces the average to 5·6 per cent.)

Skin tests with " Trichinella Extract Lederle " were done on 100 subjects, at a dilution of 1/3000 and an intradermal injection of 0·02 cc. Readings were made after 20 minutes and 24 hours. After 20 minutes 22 of the subjects gave positive reaction : 8 were positive only after 24 hours.

Precipitin tests were made of 50 males and 51 females, aged from 4 to 68 years. There were 28 positive results : 15 were only slightly positive. In 67 cases, these results were compared with the results of the skin tests. It is noted that in 8 cases the skin test was negative and the precipitin test positive.

The relation between age, eosinophilia, skin and precipitin tests are also compared. Positive skin and precipitin tests were found in the older persons. There was a poor correlation between these tests and the degree of eosinophilia.

The results of all these examinations are shown in tables by age-groups.

Pediculus capitis was present in every case, though there were only 3 cases of clinical scabies.

In discussion, the authors observe that while the incidence of *Enterobius* was high, more complete swabbing would almost certainly have increased the number of positive findings. The overall incidence was very similar to that found in the Southampton Island group, as was the incidence of *Diphyllobothrium* ova. *Entamoeba coli* was commoner in the Igloolik group.

Trichinosis appeared to be less prevalent than in the Southampton Island group : eosinophilia was less and the early positive skin tests were 22 per cent. compared with 46 per cent. at Southampton Island. Similarly the positive precipitin tests were 28 per cent. (more than half being only slightly positive) compared with 40 per cent. in Southampton Island.

H. J. O'D. Burke-Gaffney

Bueding, E. & Charms, B. **Respiratory Metabolism of Parasitic Helminths without Participation of the Cytochrome System.** [Correspondence.] *Nature.* 1951, Jan. 27, 149.

Benetazzo, B. & Pansa, G. Aggiornamento delle terapie antielmintiche. [**The Development of Anthelminthic Therapy.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Dec., v. 31, No. 12, 853–82. [Numerous refs.]

A general review.

van Wezel, R. L. **Bilharziasis in the Transvaal. Its Diagnosis and Incidence.** *South African Med. J.* 1951, Jan. 20, v. 25, No. 3, 44–7, 3 figs.

In this interesting paper the author reports on the incidence of bilharziasis in the Transvaal, and the methods adopted to establish its diagnosis.

He examined the urine microscopically in each of 15,000 unselected European and African children and adults, drawn from South Central Transvaal, Western and North-Western Transvaal, the Waterberg district, South-Western Transvaal, Eastern Transvaal and Northern Transvaal. The urines were centrifuged and examined microscopically. Those containing red cells only, but no ova, were regarded as doubtful.

He found the average incidence among European school children to be 7 per cent. and the average probable incidence (that is, adding the doubtful results to the positive) approximately 11 per cent. The incidence was lowest in South-West Transvaal, increasing steadily towards the Northern and Eastern parts of the Province.

Among Africans in the North and Eastern Transvaal, the incidence was considerably higher, the average positive incidence being 44·5 per cent. and the average probable incidence 56 per cent.

The author then performed biopsies on 30 Africans and 10 Europeans from the Eastern Transvaal, employing the technique devised by Ottolina and Atencio of South America. He removed a small portion of rectal mucosa through a sigmoidoscope, washed it in saline or water and spread it on a slide for microscopic examination. The cases were all unselected and drawn from a very wide area.

All 10 Europeans had ova of *S. haematobium* in the urine. The rectal biopsies were positive for this egg in 6 cases, but in 2, lateral-spined ova were discovered.

Of the 30 cases in Africans, only six showed ova in the urine, but no less than 20 revealed *S. haematobium* eggs in rectal snippings, and 15 showed ova of *S. mansoni*.

Admitting the small number of cases thus examined, the author draws the following conclusions on the rectal snip procedure.

1. The incidence of *S. mansoni* infestation among Africans is high.
2. The existence of double infestation is by no means uncommon.
3. The presence of *S. haematobium* ova may be detected in the rectal mucosa when urine examination fails to reveal them.

The author is of the opinion that rectal biopsy performed in conjunction with urine examination is preferable and would give a higher percentage of positive diagnoses than either method individually.

The intradermal cercarial antigen test was employed, but the author reports that in 100 school children free from Schistosomes, in a non-endemic area in South Africa, 15 positive and 18 doubtful reactions were obtained. The negative error, however, was much less. In 180 children passing ova of *S. haematobium* in the urine, only 4 gave negative reactions.

Brief reference is made to the value of bladder calcification as a diagnostic sign and also to the presence of eosinophilia, which should always raise suspicion in an endemic area.

The paper is illustrated by 3 figures and 2 tables. *M. Gelfand*

Egidio, L. Note di epidemiologia della schistosomiasi vescicale nella zona del medio Uebi Scebeli e rilievi circa la profilassi e terapia. [**Epidemiology, Treatment and Prevention of Schistosomiasis of the Bladder along the Middle Reaches of the Webi-Shebeli in Somaliland.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Oct., v. 31, No. 10, 769–75. English summary (6 lines).

Egidio writes from 17 years' experience of the sanitary and health conditions on a plantation covering an area about 50 miles long and 30 miles wide which is crossed by the river Webi-Shebeli and its system of irrigation canals. *Bulinus contortus* and *Physopsis africana* are prevalent in these channels as well as in numerous artificial rain water holes many miles away, from which the local Africans drink and in which they also bathe. Patients say that bathing gives them an urge to micturate, and this explains how these water-holes become foci of infestation by the schistosome in their turn.

The plantation provides a hospital [bed total not stated] in which 40 cases of schistosomiasis of the bladder have been demonstrated in two years : some of this number represent relapses. A census has been recently undertaken in the area and 520 cases of haematuria have been found in 2 months ; the ova of *S. haematobium* have been demonstrated in about one-third of these cases. The population of the area is estimated at about 30,000 and the census is expected to reveal about 1,000 cases (3·33 per cent.) showing clinical signs of schistosomiasis of the bladder. Systematic laboratory search would probably reveal a still higher incidence. Adults are found more often affected than children, men more than women, and farmers more often than herdsmen or other workers.

The drugs used in treatment have varied with the supply position but, when the more special preparations were not available, 16 intravenous injections of

1 per cent. tartar emetic in doses rising from 3 to 12 cc. and given at 3 days intervals have been found effective. The introduction of " Miracil D " or " Nilodin " is a great advance : 5 days' treatment by mouth cures 95 per cent. of cases and the drug can be used for mass treatment, given through specially trained, otherwise unqualified, personnel. Persevering health education to correct local insanitary habits combined with mass treatment provide the best preventive measures. The burning of river and canal banks by the use of a flame-thrower has proved disappointing as a measure of control for this condition. *J. Cauchi*

BUTTNER, Alice. Labilité particulière du sexe chez *Schistosoma mansoni* (Plathelminthe, Trématode). Essai d'interprétation. [**Sex Instability in a Strain of *Schistosoma mansoni* and its Suggested Significance.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, No. 4, 297–307, 2 figs. [16 refs.]

After a brief review of previous investigations on hermaphroditism in *Schistosoma mansoni* the author gives an account of personal researches with an African strain of this parasite and a variety of experimental animals. Her results differ from those of previous findings in that in guineapigs exposed to mixed male and female cercariae, all the male worms recovered showed evidence of hermaphroditism, although female worms were present in equal numbers and many males and females were paired. In mice, on the other hand, only normal worms resulted from infection and in 550 male worms examined, no trace of female genitalia was found. Two rabbits were completely immune to infection. The whole question of the meaning and causation of hermaphroditism in this African strain of *S. mansoni* is discussed at some length. Whereas its normal development in mice and its sexually abnormal development in guineapigs suggests that the phenomenon could be accounted for by some physiological effect exerted by the host, this explanation is at variance with the fact that other *S. mansoni* strains and other schistosome species do not exhibit similar abnormalities. It seems probable that the character of sexual instability is inherent in the African strain and that it manifests itself in the presence of certain physiological conditions provided by certain definitive hosts. *J. J. C. Buckley*

PARAENSE, W. L. & SANTOS, J. M. Dados negativos sobre a ocorrência do *Tropicorbis centimetralis* em Belo Horizonte (Estado de Minas Gerais). [**Negative Data on the occurrence of *Tropicorbis centimetralis* in Belo Horizonte (State of Minas Gerais).**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 199–212, 8 figs. & 1 graph. English version 213–18.

" After observing numerous breeding places of planorbid snails in the city of Belo Horizonte (State of Minas Gerais), we selected four among them, which seemed to be representative of the various mean diameters of the snails observed. Monthly captures were made during a year in those four breeding places. The biometric analysis of the samples indicated the absence of any *centimetralis* population (made up by individuals with 1–11 mm in diameter). The dissection of every snail showed that, with the exception of a single specimen with 10 mm, the infestation with *S. mansoni* occurred exclusively in specimens within the range from 12 to 30 mm.

" The results of these observations indicate that *T. centimetralis* does not exist in Belo Horizonte."

VON BRAND, T., BAERNSTEIN, H. D. & MEHLMAN, B. **Studies on the Anaerobic Metabolism and the Aerobic Carbohydrate Consumption of some Fresh Water Snails.** Reprinted from *Biol. Bull.* 1950, June, v. 98, No. 3, 266–76, 2 figs. [13 refs.]

"1. Lymnaeidae and Physidae tolerated complete lack of oxygen less well than Planorbidae or operculates belonging to different families.

"2. All species consumed carbohydrate under anaerobic conditions and produced carbon dioxide and lactic acid. While in several species the lactic acid produced was sufficient to account for all or a large part of the carbon dioxide as liberated from bicarbonate, this was not the case in other species.

"3. The anaerobic metabolic level as measured by carbon dioxide production and carbohydrate consumption of the resistant species was, on an average, lower than that of the nonresistant ones. The former did not accumulate lactic acid within their tissues during an anaerobic period, while the latter did so to a marked degree.

"4. In most species the anaerobic carbohydrate consumption was only slightly higher than the aerobic rate. One of the reasons for this may be the probable occurrence of aerobic fermentations in these species.

"5. Lactic acid was quantitatively a major end product of the anaerobic carbohydrate consumption only in *Lymnaea stagnalis* and *Lymnaea natalensis* ; in all other species unidentified end products must have prevailed.

"6. The anaerobic carbon dioxide production followed the surface law in intraspecific comparisons in pulmonates rather closely, but definitely not in all cases of interspecific comparisons."

COUTINHO, J. O. Diagnóstico da Esquistossomose pela intradermo-reação com antigenos de esquistosomas adultos. [**Diagnosis of Schistosomiasis by the Intradermo-reaction with Antigen prepared from Adult Schistosomes.**] *Rev. Doenças Tropicais e Infetuósas.* Rio de Janeiro. 1950, Oct., v. 2, 13–19.

The author prefers using the adult worms, males and females, to the cercariae, for several reasons. They are easier to deal with, the cercariae are not readily obtained in sufficient numbers and they are mixed with impurities, in particular vegetable particles in the faeces of the mollusc, which are removed only with difficulty. His antigen is prepared as follows : Adult worms obtained from animals experimentally infested, after repeated washing in 0·7 per cent. NaCl and distilled water, are dried *in vacuo*, powdered and suspended in sodium chloride, sodium carbonate and merthiolate ; extraction is carried out in the ice-chest, the extract is then centrifuged, filtered through porcelain and kept in the cold at about 6°C. It keeps well and even after a year its potency was reduced by only 2 per cent.

For use, 0·005–0·02 cc. (usually the latter) is injected and, in positive cases, an allergic itching papule appears almost immediately, in 1 to 5 minutes, reaching its intensity in 10–15 minutes and then fading. The results are classified according to the size of the papule and its pseudopodia, into 3-, 2-, and 1-plus. Among 100 patients whose faeces contained ova of *S. mansoni*, 99 reacted positively, 51 with 3-plus, 40 with 2-plus and 8 with 1-plus. In the other one the result was doubtful. In a second group of 21 persons in endemic areas and diagnosed on clinical grounds, but in whose faeces ova were not seen, 18 gave a 3-plus and 3 a 2-plus. All had been in contact with water containing many Planorbid vectors. A third group comprised 40 persons living in places free from schistosomes. All were negative except one who gave a 1-plus. This was a girl, 10 years of age ; repeated faecal examinations showed only *Giardia intestinalis*. Further testing with specific antigen gave the same reaction, but normal horse serum did the same. *H. Harold Scott*

EL-SADR, A. R. **Surgical Aspects of Bilharziasis of the Ureter.** *Medicine & Laboratory Progress.* Cairo. 1949, Nov., v. 10, No. 11, 231–45, 8 figs. [10 refs.]

The usual site for the deposition of the ova of bilharzia in the bladder is the base and involvement of the ureter in its lower third is often co-existent. Symptoms are usually masked by those due to the bladder condition, until obstruction or complications supervene. There are two pathological types—proliferative and atrophic. The former is seen in involvement of the superficial mucosa as nodular masses, ulcers, granulations or papillomata ; ulcers may become secondarily infected and bilharzial masses may lead to mechanical obstruction of the ureter. Deposition of ova in the muscle layer leads to atrophy, fibrosis and calcification, which interferes with the contractility of the ureter, causing urinary stasis, which may be followed by mechanical obstruction due to secondary superficial lesions. In many cases ureteric involvement is localized to segments, the rest of the ureteric wall appearing normal.

Mild early involvement is often clinically silent ; in advanced cases there may be (1) stasis caused by atrophy and atony of the muscle of the wall as well as by mechanical obstruction ; (2) septic infection ; (3) formation of calculus either locally or by arrest during passage from the kidney ; ulcerated bilharzial débris supplies an excellent nidus on which urinary stasis and infection lead to stone formation, most commonly just above the vesico-ureteric junction ; (4) hydronephrosis, pyonephrosis and pyelonephritis ; (5) hypertension and cardiac decompensation from renal damage. Bilharzial stricture at the lower end of the ureter is due to fibrosis in the wall of the bladder and ureter and is frequently bilateral. A full urological examination, including cystoscopy and pyelography, both excretory and ascending in some cases, is essential. Absence of ova from the urine or a history of treatment for bilharziasis do not exclude it as the cause of the symptoms. Weak, slow or faint appearance of indigo-carmine is suggestive and a ureteric catheter may or may not pass.

A course of antibilharzial treatment is indicated if the presence of living parasites is suspected, but even after the lesions caused by the parasite are healed, the scars left by the infection may need surgical intervention. Passable strictures of the ureter may be dilated by passing ureteric catheters of increasing size and leaving them indwelling for hours or days. For impassable strictures at the ureteric orifice a meatotomy may be performed through the operating cystoscope or *via* a suprapubic cystotomy. If the stricture is higher up the ureter is exposed extra-peritoneally and, after incision, the stricture is dilated from above. Localized masses which block the lumen, or fibrosed sections of the wall, are treated by resection of the involved segment, with end-to-end anastomosis if the stricture is high up, or reimplantation into the bladder if it is in the retrovesical portion. Eight illustrations of pyelograms from the author's cases are given, but the reproduction is too poor to convey much information. [See a paper by N. MAKAR (*Brit. J. Surg.* 1948, v. 36, 148) for an excellent description of the operative technique, illustrated by reproductions of pyelograms from cases before and after operation.] *W. L. Harnett*

WATSON, J. M. & PRINGLE, G. **Clinical Investigations on the Chemotherapeutic Treatment of Urinary Bilharziasis. Part I—Intravenous Trivalent Sodium Antimony Gluconate.** *J. Trop. Med. & Hyg.* 1950, Dec., v. 53, No. 12, 233–8, 1 chart.

After a brief review of the other trivalent antimonials used in the treatment of schistosomiasis there is an account of the physical properties and toxicity in animals and man of sodium antimony gluconate.

Five male patients, aged from 18 to 45 years, and suffering from urinary schistosomal [presumably *Schistosoma haematobium*] infections were treated with trivalent sodium antimony gluconate given intravenously in doses of 180 mgm. daily for 6 days. All five patients were "completely cured"; they did not relapse, as judged by urine examinations, over three months' observation. *A. R. D. Adams*

Rodriguez-Molina, R., Acevedo, C. E., Torres, J. M., Lopez-Sanabria, U. & Ramirez-Rodriguez, E. **Treatment of Schistosomiasis mansoni with Antimony Lithium Thiomalate (Anthiomaline): Final Report.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 881–6.

The author gives the following summary :—

"1. Thirty-nine male Puerto Rican veterans ranging in age from twenty-four to fifty-nine years, and suffering from schistosomiasis mansoni were treated with a trivalent antimony compound, antimony lithium thiomalate, better known as Anthiomaline. The patients were hospitalized during treatment and for follow-up study. Thirty-eight individuals received the same amount of the drug, that is, 3 cc. of the solution (30 mgs. of antimony, every other day for a total of ten injections, containing 300 milligrams of antimony). One other case received a total of 60 cc. Anthiomaline, divided in two courses of 30 cc. each, the second course being administered five months after the first.

"2. In twenty-two patients the stools were free of ova prior to the completion of treatment. Dead ova were detected in the stools at the end of therapy in three other cases. Stool examination remained negative for ova in thirty-eight of the thirty-nine individuals studied, during a period of one to three weeks following completion of treatment.

"3. Follow-up studies beginning one month and extending to seventeen months after completion of treatment were performed in thirty cases. Twenty of these (66·6 per cent.) had positive stools for Schistosoma ova and in ten other cases (33·3 per cent.) no ova were detected. Ten patients complained of recurrence of gastrointestinal disturbances one to seventeen months after treatment.

"4. Toxic manifestations occurred in fifteen of the thirty-nine individuals treated. These were never severe and in no instance they warranted interruption of treatment.

"5. We wish to emphasize the importance of follow-up examination of the stools at frequent intervals in the final evaluation of any drug employed in the treatment of schistosomiasis mansoni.

"6. Anthiomaline, when given in one course of 30 cc. to thirty-eight individuals, and in the amount of 60 cc. to another case, is not a very efficient drug in the treatment of mild, asymptomatic or moderately severe chronic infections with *Schistosoma mansoni*, as determined by the presence of ova in the stools."

Schwetz, J. Quelques essais de traitement de la Bilharziose intestinale et de la Bilharziose vésicale par le Miracil D (Nilodin). [**Trials of Nilodin in the Treatment of Schistosomiasis.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 569–83.

The only reasonably effective, or at any rate the least ineffective, treatment of schistosomiasis is that with tartar emetic. The aim of treatment is twofold; cure of the individual, and communal prophylaxis. The incidence and severity of schistosomiasis vary in different regions of the Belgian Congo. In those areas where the infected do not suffer clinically from the disease the

purpose of treatment is primarily prophylactic ; in others where the disease causes severe symptoms its purpose primarily is curative. Patients from the latter areas may submit readily to treatment ; those from the former do not do so willingly, and they are even more reluctant if the treatment is lengthy and unpleasant. Search is therefore being made for a simple treatment free from unpleasantness ; Miracil, as it can be given orally, was deemed worthy of trial to this end.

Thirty-five patients, of ages from infancy upwards, suffering from intestinal schistosomiasis [passing terminal-spined eggs] were treated with English-made Nilodin [Miracil D]. Eighteen of these were in the Lake Albert area ; 17 were in the Kibali-Ituri district, an area of hyperendemicity. The results were very variable in both areas ; though the symptoms diminished, parasitic cure was apparently obtained in only a minority, but the proportion of living eggs voided diminished. Further investigations are to be conducted to determine more precisely the effectiveness of Nilodin in intestinal schistosomiasis.

Twenty-eight patients of all ages suffering from vesical schistosomiasis, due to *Schistosoma haematobium*, in the Lango province of Uganda were similarly treated. The clinical results were excellent, but again the number of parasitic cures was disappointing, though less so than with the intestinal disease.

A. R. D. Adams

CORT, W. W. **Studies on Schistosome Dermatitis. XI. Status of Knowledge after more than Twenty Years.** *Amer. J. Hyg.* 1950, Nov., v. 52, No. 3, 251–307, 3 figs. [Numerous refs.]

In 1928 [this *Bulletin*, 1928, v. 25, 946] the author showed that the cercariae of schistosomes parasitic in some birds or mammals would penetrate the human skin and produce dermatitis and a papular eruption. In 1935 [this *Bulletin*, 1936, v. 33, 554] he summarized the information on schistosome dermatitis up to that date. In this paper he again reviews the knowledge up to the present time.

The points of immediate interest to the practitioner in the tropics include the following. Schistosome dermatitis is the name given to the lesions produced by the penetration of any of the cercariae of the Schistosomatidae into the skin of man or of any other normal or abnormal host. In a table are listed 18 cercariae proven, either experimentally or in nature, to cause schistosome dermatitis in man. While the snail hosts of all of these cercariae are known, in many cases neither the adult worms nor the definitive hosts have yet been determined. There is every reason to expect that other schistosome cercariae will be found to cause dermatitis in unexplored areas of South America, Africa and Asia.

There is a detailed account of the pathology, the immunology and the clinical course of schistosome dermatitis. The cercariae of the three human species of schistosomes rarely cause severe lesions with a papular eruption. It has been shown experimentally that the penetration of a first batch of the cercariae of *Schistosoma japonicum* is unattended by significant skin lesions ; but super-infection 50 to 60 days after a heavy primary infection results in dermatitis. On no occasion is the reaction in the skin severe enough on primary infection to destroy penetrating cercariae, even with very heavy infections. On heavy reinfestation dead and disintegrating cercariae, surrounded by an intense cellular reaction, are to be found in the deeper layers of the skin.

Penetration of the cercariae of the non-human schistosomes causes prickling or itching for an hour or so, and the appearance of small macules which may persist for some hours. In some cases there is a diffuse erythema rather than a macular eruption, and occasionally there is a local urticaria. Ten to 15

hours after penetration papules replace the macules, and the appearance of these is associated with intense itching. Sometimes after heavy exposures the papules become confluent. The papules usually disappear within a week, leaving pigmented spots, but the itching stops within a few days. On the second or third day vesicles may form ; these are ruptured by scratching, and on bacterial infection they may become pustular. In initial infections, both natural and experimental, schistosome cercariae may produce only a slight reaction ; on repeated exposure the reactions are much more pronounced ; this increase in the severity of the lesions is due to sensitization. In highly sensitized individuals the reaction, even to small numbers of cercariae penetrating a very limited area of skin, may be considerable ; if large areas of skin are penetrated by great numbers of cercariae there may be a very severe generalized reaction with prostration. Some individuals do not become sensitized even after repeated exposures to cercariae over long periods ; the reason for this is obscure.

There is a lengthy and detailed account of the geographical distribution and epidemiology of schistosome dermatitis, and of its prophylaxis, control and treatment. As schistosome dermatitis is of considerable economic importance to the holiday freshwater bathing resorts in North America much attention has been devoted to its control. Copper sulphate (1/500,000) and copper carbonate in solution are effective in destroying snails ; the methods of their application and their virtues and disadvantages are fully considered. A mixture of the two salts, applied under suitable conditions, has proved very effective in controlling schistosome dermatitis at certain resorts ; some newer molluscicides are now stated to show promise.

Personal protection against cercariae is afforded by wearing rubber boots, or even by wearing a moderately tightly woven cloth. A film of oil or grease on the body is ineffective ; indeed it encourages the attachment of those cercariae which normally penetrate the oily skins of water-birds. A thick coating of solid vaseline is an effective preventive. The treatment of schistosome dermatitis is palliative. The antihistamine drugs are said to give relief, but further information on this point is necessary.

[This detailed and lengthy paper is accompanied by an extensive bibliography and a few excellent illustrations. It virtually is a monograph on its subject matter, and should be consulted as such.] *A. R. D. Adams*

Garduño, D. M. & Carpio, D. **Paragonimiasis : a Report of Three Cases with Pulmonary and Neurological Symptoms.** *J. Philippine Med. Ass.* 1950, June, v. 26, No. 6, 253–60, 2 figs.

Three cases of paragonimiasis that were originally diagnosed as pulmonary tuberculosis are reported. All three patients were young Filipino soldiers from Leyte and Mindoro, recognized areas of this infection. All three gave a history of having bathed in fresh-water pools [this is not usually held to be a source of transmission] and of having eaten raw or partially cooked crustaceans.

The onset in all three cases was with haemoptysis of sudden onset after undue exertion, followed by chest pains, a productive cough, but little or no fever. The haemoptysis, varying from red specks in the sputum to a cupful of blood, occurred only at the onset and at intervals during the first few months. Chest pain was not severe and was generalized and transient ; it was usually a dull ache but occasionally boring in character. The cough was moderate in severity and at first productive ; it tended to disappear. The sputum was moderate in amount, showed occasional specks of blood with rice-grain dark brown bodies in which the eggs of *Paragonimus westermani* were found and in one

case, on one occasion, acid-fast bacilli. There was no fever, night sweats, loss of weight, anorexia or lymphadenopathy.

There were few physical signs, but in one patient crepitant râles were heard at the apices.

Unusual neurological signs appeared in one patient : he developed sudden paresis and anaesthesia of the left leg below the knee. The paresis of the upper left arm and shoulder appeared first, but was cured by shock therapy, after which the weakness and anaesthesia of the left leg developed. There was also defective hearing of the left ear. The deep and superficial reflexes were brisk.

Radiological signs were completely absent in one case. In another there was infiltration in the left infraclavicular region ; this was not the case showing acid-fast bacilli. In two cases there was some blunting of the costophrenic angle on one side. This is a common observation in paragonimiasis and suggests basal pleurisy at the time of the penetration of the diaphragm by the parasite.

Paragonimus westermani were found in the sputum of all three cases during the acute phases, but later disappeared. There was a slight degree of eosinophilia. *Paragonimus* ova were found in the stools in one case and also hookworm and *Ascaris*. The Wassermann and Kahn reactions were all negative and the spinal fluid and fundi were normal in the case with the neurological symptoms.

Emetine hydrochloride ½ grain was given daily for a week followed by potassium iodide for a month. This treatment appeared " to arrest the disease clinically " but the neurological symptoms persisted. *L. E. Napier*

Pick, F. Sur des oeufs de formation tératologique du trématode *Watsonius watsoni*. [**Teratological Eggs of the Trematode** *Watsonius watsoni*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 704–5.

The following is a translation of the author's summary :—

Pyocyanin provokes *in vitro* the formation of non viable teratological eggs in the trematode *Watsonius watsoni*. [The eggs were morphologically abnormal.] *H. J. O'D. Burke-Gaffney*

Neghme, A., Bertín, V., Tagle, I., Silva, R. & Artigas, J. *Diphyllobothrium latum* en Chile. II. Primera encuesta en el Lago Colico. [*Diphyllobothrium latum* **in Chile. II. First Survey of Lake Colico.**] *Rev. Kuba Med. Trop. y Parasit.* 1950, Sept.–Oct., v. 6, Nos. 9/10, 134.

The English summary appended to the paper is as follows :—

" The authors have made a coprological survey among 81 inhabitants of the Colico lake (39° 20′ South lat.) and find one infected with *Diphyllobothrium latum*. Moreover, they report the parasitism with *sparganum* of three specimens of rainbow trout (*Salmo irideus* ?)."

Neghme, A., Bertín, V., Donckaster, R., Silva, R., Artigas, J., Bunster, A., Muñoz T., F., Faúndes, A. & Basso, B. *Diphyllobothrium latum* en Chile. III. Nuevas encuestas coprológicas en el sur del país y comprobación de un caso autóctono en Santiago. [*Diphyllobothrium latum* **in Chile. III. New Parasitological Survey in the South of Chile and Confirmation of an Indigenous Case in Santiago.**] *Bol. Informaciones Parasitarias Chilenas*. 1950, Oct.–Dec., v. 5, No. 4, 42.

The English summary appended to the paper is as follows :

" From the stool examinations of 797 inhabitants of Arauco and Cautín provinces the authors have found nine of them infected with *Diphyllobothrium*

latum. Moreover, they have found an indigenous human case at Santiago city. Up to date, twelve human cases of diphyllobothriasis have been diagnosed in Chile."

GAUGUSCH, Z. Przyczynek do badan nad odpornością wągra nierogacizny. [**Contribution to the Study of the Resistance of Pork Cysticercus.**] *Przegląd Epidemiol.* Warsaw. 1950, v. 4, Nos. 1/4, 98–103.

The English summary appended to the paper is as follows :—

" Pork cysticercus is highly resistant to moderately low temperatures. The temperature from 0° to −2°C kills it only after 53 days. Below −2°C it is killed due to the freezing of the fluid inside cysticercus vesicle ; at that temperature it may survive for 6 days between deep layers of the muscles, especially those surrounded with fatty tissue.

" Brine has been most effective in killing cysticerci. In proper concentration it penetrates rapidly inside the vesicle and kills the cysticercus in 3 days.

" In decaying meat cysticercus survives for 26 days. This fact is not without significance in the epidemiology of cysticercosis."

FAURE, J. Contribution à l'étude de l'echinococcose dans la région de Marrakech. [**Study of Echinococcosis in the Marrakesh Region.**] *Bull. Inst. Hyg. Maroc.* 1949, v. 9, Nos. 3/4, 211–32, 3 maps. [25 refs.]

This enquiry into echinococcosis in the Marrakesh region of Morocco was based on a study of previous literature, hospital and abattoir records, interrogation and some personal observations. From the veterinary aspect it appears that there is a high incidence of infection in stray dogs (up to 70 per cent.) and that town dogs have a lower incidence than others. Abattoir records at Marrakesh showed the incidence of hepatic hydatid cysts during 3 years to be 15 per cent. in cattle, 5 in sheep, 6 in goats, 14 in pigs, and 44 per cent. in camels. In the human host there are 62 records during the past 20 years from Marrakesh and environs, of which 57 were in Mussulmans, 3 in Israelites and 2 in Europeans. Twenty-four of these were males and thirty-eight females. Only four were children. In Safi and Safi territory one hospital reports 12 cases in 1937–1949 and another 16 during the two periods 1941–1945 and 1947–1949. In Mogador, 3 cases are reported from the mixed hospital during 1940–1944 while during the 20 years prior to 1935 there were 7. Few have been reported elsewhere in the Region.

The data are summarized as follows : During 20 years, 98 cases have been diagnosed in the Region as a whole, of which 93 were in Mussulmans, 3 in Israelites and 2 in Europeans. Having regard to the population of these three races, the figures do not exhibit any racial difference as to the rate of infection.

The liver is the most commonly affected organ (65 cases) and the other organs in the following frequency : muscle (13), peritoneum (11), lung (10), kidney (4), spleen (3), orbit (3) and pancreas (1). Women are more often affected than men, in the ratio of 52 to 37, and children account for 7·8 per cent. of cases. Agricultural workers are the principal sufferers ; butchers and abattoir employees do not appear to be unduly exposed. Various factors concerned in the transmission of hydatid disease to man are discussed, and three lines of prevention are suggested : 1. Extermination of stray dogs. 2. Organized meat inspection in all *souks* and proper disposal of diseased organs. 3. Burial and destruction of animals that have died. *J. J. C. Buckley*

Boero H., M. Frecuencia de la localización hepáticopulmonar y fertilidad de los quistes hidatídicos en vacunos, ovinos y porcinos. [**Frequency of Hepatic and Pulmonary Localization and Fertility of Hydatid Cysts in Cattle, Sheep and Pigs.**] *Bol. Informaciones Parasitarias Chilenas.* 1950, Oct.–Dec., v. 5, No. 4, 43–4.

The English summary appended to the paper is as follows :—

" The author studies the distribution in liver and lung and the fertility of hydatid cysts found in 1000 cattle, 1000 hogs and 1000 sheep killed in the Municipal Slaughterhouse of Santiago. He found that the presence of scolex was higher in the cysts from sheep (90%). In regard to the distribution he found that the frequency of lung localization was higher in the three species."

Gärtner, H. & Müting, L. Über die Infiltrationstiefe von Askariden-Eiern im Boden. [**The Penetration of *Ascaris* Eggs into the Soil.**] *Ztschr. f. Hyg. u. Infektionskr.* 1951, v. 132, No. 1, 59–63, 2 figs. [13 refs.]

The high percentage of worm infestations in Münster where sewage is led on to land which is to be cropped, directed attention to the question of the depth to which the eggs of *Ascaris* can penetrate into the soil. By means of a simple sampler, of which some description is given, specimens of earth were obtained from various depths down to 100 cm. In a number of samples taken 11 months after the dosing of the soil with sewage, eggs were found to a depth of 30 cm. but rarely beyond this depth. Samples taken a few days after the application of sewage were positive to a depth of about 40 cm. *M. E. Delafield*

Etteldorf, J. N. & Crawford, L. V. **Treatment of Ascariasis in Children. Use of 1-Diethylcarbamyl-4-Methyl Piperazine Dihydrogen Citrate (Hetrazan).** *J. Amer. Med. Ass.* 1950, July 1, v. 143, No. 9, 797–9. [Refs. in footnotes.]

The authors emphasize the importance of *Ascaris* infections and quote the paper of Ochsner and his colleagues [this *Bulletin*, 1949, v. 46, 955] on the numerous and serious surgical complications of this infection.

No anthelmintic hitherto used is entirely satisfactory. Hexylresorcinol is an irritant and has to be taken in capsules, it requires an empty stomach for its full action, and must be followed by a purge. Oil of chenopodium is a toxic drug, and santonin is not very effective and is also toxic. The reports on the use of 1-diethyl-carbamyl-4-methyl-piperazine dihydrogen citrate [Hetrazan] in different countries are very variable.

In the investigation now reported most of the 15 children were in hospital and were subject to examination of urine, blood and faeces every other day. Hetrazan, a proprietary preparation of this drug, was used in thrice daily doses of 3 mgm. to 5 mgm. per kgm. body-weight. Later the dose was increased to 6 mgm. per kgm. The drug was usually continued until the stools were free of ova ; the number of days varied from 7 to 9. No purgative was given. The first 4 patients received the lower dosages 3 to 5 mgm. per kgm. thrice daily for 8 days ; of these only one showed stools clear of ova, but he was not followed up. The remaining 11 received a dose of 6 mgm. per kgm. thrice daily for 7 to 9 days ; in one patient the infection persisted throughout treatment but the remaining 10 were cured. The first ovum-free stool was observed between the second and sixth days, and follow-up examinations at two weeks and one month were negative. In one case only was there any toxic effect due to this drug : this child had nausea and loss of appetite.

Three normal children were given doses of 10 mgm. per kgm. thrice daily for seven days without toxic effects.

The worms passed were recorded. They were usually passed in a "near-dead" condition and showed minimal movement to stimuli. The number of worm passed by the successfully treated patients varied from 2 to 7 ; those in which the infection persisted passed 3, 4, 18 and 19 worms, respectively ; and the patient in which the result was doubtful passed 18. The failures thus included some very heavily infected patients.

The authors conclude that this drug in doses of 6 mgm. per kgm. thrice daily for at least a week will safely and effectively remove *Ascaris* without starvation or purgation. *L. E. Napier*

KELLER, P. **Sterilisation of Sewage Sludges.** *Pub. Health.* Johannesburg. 1951, Jan., v. 15, No. 1, 11–17.

It has been assumed in the past that dried, digested sewage sludge can be safely used as a fertilizer, as it has been thought that ova and cysts of parasitic organisms were rendered non-viable by conventional methods of sewage treatment. Recently however it has been shown that some helminth ova are still viable after digestion at mesophilic temperatures and drying on sand beds.

In a study made at Johannesburg *Ascaris lumbricoides* was used as the test organism, as it is known that the ova of this nematode are the most resistant to mechanical and chemical influences of all parasitic ova and cysts found in sewage. It was found that the number of eggs in crude and digested sludge at two of the sewage works of Johannesburg was fairly constant between 1,000 and 3,000 per gm. of dry matter. After various experiments which confirmed that mesophilic digestion and drying would not completely destroy *Ascaris* ova, laboratory experiments were made which showed that thermophilic digestion at a temperature of 53°–54°C. for 24 hours resulted in complete inactivation of all *Ascaris* eggs. This method of treatment, however, has various disadvantages, one being that the sludge is less easily "dewatered" than sludge which has been subjected to mesophilic digestion. As it was considered that it was the high temperature reached, and not thermophilic digestion as such, that destroyed the ova, further tests were made in which crude, digested, and dried sludges containing ova were immersed in a water bath at a temperature of 55°C. for varying periods of time ; in all cases heating for 120 minutes inactivated all the *Ascaris* ova. It is therefore suggested that before use as a fertilizer, sludge should be heated for 2 hours to a temperature of 54°–55°C. Care must be taken to ensure that the sludge is heated throughout to the temperature required, and to effect this it may be desirable to extend the period of heating when large quantities of sludge are being treated.

N. H. Johnson

DASSANAYAKE, W. L. P. **Filariasis—a Public Health Problem.** *J. Ceylon Branch Brit. Med. Ass.* 1950, Mar., v. 45, No. 1, 27–34. [18 refs.]

Two types of filarial infection are prevalent in Ceylon. Bancroftian filariasis, resulting from infection with *W. bancrofti*, and rural or Malayan filariasis, caused by *W. malayi*, the latter being the predominant species. Malayan filariasis is entirely restricted to areas offering facilities for the prolific breeding of *Mansonia* mosquitoes ; these areas being usually associated with dense growths of floating water plants, mainly *Pistia stratiotes*, occurring at the estuaries of rivers and in the tank areas in the North-Western province and Hambantota District. Most of the *Pistia* infestations occur in neglected

tanks and water collections, and the control of Malayan filariasis by the removal of these water plants, which are necessary for the development of the vector, presents no insuperable problems. This is particularly true at the present time, when an intensification of agricultural schemes is leading to such water supplies being kept in better condition. Bancroftian filariasis is confined to Colombo and its suburbs, where the vector, *Culex fatigans*, breeds freely in catch pits near latrines and in stagnant water collections. There appears to be less hope of the successful control of Bancroftian filariasis than of Malayan filariasis, and since the total eradication of *C. fatigans* is not likely to be economically successful in Ceylon, " the only remedy lies in weakening some of the links in the transmission cycle ". The health authorities are doing their utmost to minimize the immediate dangers of the spread of Bancroftian filariasis, mainly by the larvicidal treatment of the breeding places, but no control measures can be successful unless the house-holders render active assistance and their co-operation is now being encouraged by intensive educational and health propaganda. The paper concludes with an interesting reference to the chemoprophylactic value of hetrazan—" 587 cases of microfilaria have been treated with hetrazan so far. Of these 395 have been examined after treatment by night blood examination and of these 369 have been freed of microfilaria." *R. M. Gordon*

KENNEY, M. & HEWITT, R. **Psychoneurotic Disturbances in Filariasis, and their Relief by Removal of Adult Worms or Treatment with Hetrazan.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 895–9. [12 refs.]

In the Belgian Congo one of the authors observed a number of cases in which loiasis was suspected as the cause of insomnia, mental depression, irritability and severe headaches.

The present paper describes two of the most severe of these cases, together with others (in British Guiana) associated with *W. bancrofti*. A relationship between central nervous symptoms and filariasis appears to have been established in these cases, since surgical removal of adult *L. loa*, and the treatment of *W. bancrofti* with hetrazan, was followed by disappearance of symptoms.

The possibility of psychoneurotic disturbances as well as other allergic manifestations of the central nervous system being due to filariasis should be considered seriously in hyperendemic areas. The surgical removal of worms in loiasis, and hetrazan treatment in *Loa loa* infections as well as those associated with *W. bancrofti*, appear to offer the most promising method of treatment for this filarial syndrome. *P. Manson-Bahr*

HUNTINGTON, R. W., Jr., EICHOLD, S. & SCOTT, O. K. **Acute Allergic Filarial Lymphangitis (Mumu) in American Troops in the Samoan Area in World War II.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 873–80. [55 refs.]

Although the problem of filariasis in troops in Samoa did not prove as momentous as had been feared, yet it retained ample interest. *Mumu*, the Samoan title for the condition is lymphangitis of an extremity with funiculitis and epididymo-orchitis. Data are quoted supporting the belief that it is the result of an allergic reaction to filarial protein. The gist of this paper is an extensive argument on these lines, together with reference to gaps in our knowledge both on the life history of *W. bancrofti* and the aetiology of elephantiasis, based upon data already considered in this *Bulletin*.

P. Manson-Bahr

LAGRANGE, E. **Effect of Ultrasonic Vibrations on Filariasis of the Cotton Rat (*Sigmodon hispidus*).** [Correspondence.] *Nature.* 1951, Feb. 10, 245.

With an apparatus working on a frequency of 940 kc./s. the authors exposed cotton rats infected with *Litomosoides carinii* to ultrasonic vibrations.

The quartz vibrator was rubbed on the wetted chests of two cotton rats, on the first at 1·5 watts/cm.², on the second at 2 watts/cm.² for two minutes. The microfilariae in ten fields decreased from 100 to 9 and from 30 to 4 respectively in the first week. In the first rat, they rose again to 40, but the second animal died, with diarrhoea and conjunctivitis, on the eighth day. In this animal the adult filariae were alive ; larvae were seen in the uterus at the morula stage and some others were more advanced but granular and irregular.

In a second experiment, three cotton rats each received 1·5 watts/cm.² for 1, 2 and 5 minutes daily for 3 successive days : daily blood examinations were made. There was no effect seen in the first rat, in the second the microfilariae fell from 25 to 3 and in the third from 30 to 1 : this last animal died on the seventh day, with symptoms in the rat and uterine appearances in the filariae similar to those in the first experiment.

The author observes that the similar symptoms in rats and the similar action on the microfilariae in the case of the rats receiving the highest doses in each experiment suggest that the action was due to the ultrasonic vibrations probably acting on the parasites. The author was unable to try other frequencies which might be more effective against the parasites and less harmful to the host.

It is noted that the action on the microfilariae was very similar to that observed by the author and BETTINI (*Riv. di Parassit.*, 1947, v. 8, 191) on *Dirofilaria immitis* of the dog after injection of dibromosalicyl.

Similar experiments with *Schistosoma mansoni* in mice were completely negative. *H. J. O'D. Burke-Gaffney*

OELKERS, H. A. Untersuchungen an Oxyureneiern. [**Researches on *Enterobius* Eggs.**] *Ztschr. f. Parasitenk.* 1950, Nov. 2, v. 14, No. 6, 574–81.

The author collected from children *Enterobius vermicularis* that had emerged from the anus during the evening and put them in aluminium boxes in which they died in a few minutes. The boxes were kept at room temperature, in the incubator and in the ice-chest, the temperature of the latter being " +6–8°C." by day and " +2–5°C." by night. One worm was removed from the ice-chest every fifth day and one worm daily from the other boxes. The eggs expressed from these worms were in the early tadpole stage. They were incubated at 36–37°C. in hanging drops of 0·05 per cent. thymol (to keep down bacterial development). After about 18 hours they were transferred to pepsin and " 0·02 n " hydrochloric acid to facilitate the emergence of the larvae.

After 2 weeks in the ice-chest 80 to 90 per cent. of the eggs were able to develop, but after this period their ability to develop decreased until, after 6 weeks in the ice-chest, only a few larvae developed. A second experiment showed much the same results. When the eggs were dried on slides and kept in the ice-chest, they died sooner, only occasional larvae developing in these after 4 weeks' cooling. Eggs from worms kept at room temperature died much sooner than those kept in the ice-chest. At summer room temperatures of 20–24°C. the eggs lived only 2–3 days, as LENTZE (*Veroff. Med. Verw.*, 1932, v. 37, 51) also found. At cooler room temperatures of 17–20°C. by day and 12–15°C. by night, nearly 100 per cent. of the eggs usually developed after 3 days and even on the

fourth and fifth days some developed in the incubator. Much the same results were obtained with eggs taken from worms freshly collected and put into hanging drops ; but eggs dried and kept at room temperature and then moistened with Ringer's solution and incubated at 36–37°C. did not live so long. These results seem to conflict with those of SCHÜFFNER [this *Bulletin*, 1950, v. 47, 70] and SCHÜFFNER and SWELLENGREBEL [*ibid.*, 1949, v. 46, 960], who found that eggs obtained from schoolroom dust were infectious for 20 days ; but in fact they do not, because Oelkers found that incubation of the eggs until they contained larvae strikingly increased their length of life. Eggs containing larvae lived in water or Ringer's solution at 15–20°C. for 4 weeks and at a temperature below 10°C. for 10 weeks ; and when they were dried they lived at 17–20°C. for 2–3 weeks and at 14–18°C. for 4–5 weeks. Anal smears taken in the morning showed that eggs in them developed completely during the night at the temperature of the anal region, so that eggs on soiled linen and in the dust of schoolrooms are largely completely developed and are, if the environment is suitable, infectious for several weeks. It is only the eggs at the tadpole stage that die in 2–3 days at room temperatures.

Oelkers could not confirm the statement of LENTZE (*loc. cit.*) that eggs kept at their optimum temperature of 36–37°C. on damp surfaces live for 10 days. He found that mobile larvae developed in 7 hours in eggs kept at 36–37°C. in hanging drops, but that treatment of the eggs with pepsin-hydrochloric acid to help the emergence of the larvae showed that, from the fourth day onwards, most of the larvae quickly died and that by the fifth or sixth day few could leave the eggs. When dried eggs were kept at 36–37°C. with a relative humidity of 35–40 per cent., most of them died in 10 hours without development and those which showed development died in 30 hours. Increase of the relative humidity to 75–80 per cent. made little difference. Much the same results were obtained when eggs or worms were incubated at 28–30°C. with a humidity of 35–40 per cent., but, when the humidity was increased to 85–90 per cent., most of the eggs developed and living larvae emerged from them after treatment with pepsin-hydrochloric acid.

The author found that eggs at the tadpole stage would not develop at temperatures under 23°C. and that they developed completely in 48 hours at 24–25°C. Increasing temperatures quickened their development until at 41–42°C. they developed in 4½ hours ; but at temperatures over 43°C. only a few eggs developed and at 47°C. none did. These eggs resisted 50–52°C. for 3–5 minutes and then developed normally in the incubator. After 24 hours at —20°C. to —22°C. these eggs would not develop and only a few of them survived 5–8 hours at this temperature.

Completely developed eggs were more resistant. They withstood 45–48°C. for 6 hours or longer. The larvae in them died in 1½–2 hours at 50°C., in half an hour at 52°C. and in 5–10 minutes at 53–54°C. A not inconsiderable number of them survived —20° to —22° for 20 hours. These results are compared with those obtained by ZAWADOWSKY and SCHALIMO (*Ztschr. f. Parasitenk.*, 1929, v. 2, 12). They indicate, the author concludes, that eggs adhering to the skin will not be killed by washing with hot water, because water at 50°C. is very uncomfortable even after a few seconds.

The eggs are also very resistant to antiseptics (*cf.* OELKERS and ZEISSLER, this *Bulletin*, 1942, v. 39, 709 and ZAWADOWSKY and SCHALIMOW, *Arch. Exper. Path. u. Pharm.*, 1943, v. 200, 518). Further work by Oelkers showed that hydrogen peroxide damages the eggs, but that, in order to kill them in a few minutes a 30 per cent. solution of it is required. In the official 3 per cent. solution a few eggs lived for 24 hours or longer, but even a 0·6 per cent. solution killed many eggs in this time. Weaker solutions were ineffective. The eggs were not harmed by 5–10 minutes in ether, chloroform, carbon tetrachloride or

benzine. Zawadowsky and Schalimow (*loc. cit.*) showed that absolute alcohol requires half an hour to kill 100 per cent. of them.

Eggs at the tadpole stage are relatively sensitive to acids. In the incubator practically 100 per cent. of eggs suspended in " 0·01 n " hydrochloric acid or acetic acid are dead in 20 hours. In " 0·05–0·1 n " hydrochloric acid a swelling of the outer shell layer could be seen in half an hour, but when this solution was neutralized with caustic soda or sodium bicarbonate, the eggs still developed normally. Household vinegar will therefore not completely destroy the eggs. Treatment with acids damaged only eggs at the tadpole stage. It caused swelling of the outer shell layer of fully developed eggs also, but the larvae in these eggs were still mobile after 48 hours and in pepsin-hydrochloric acid they emerged apparently undamaged, although they died in the acid in 1–2 hours. The inner shell membrane is thus impervious to acids. A similar swelling of the outer shell layer also occurred in 0·05 and 0·1 n caustic potash, but in this the eggs developed to the tadpole stage and larval stages in the normal time. A 3 per cent. solution of sodium carbonate solution also causes swelling of the outer shell layer, but does not kill the eggs.

Larvae recently emerged from eggs showed a resistance to cold and heat similar to that shown by the fully developed eggs. They withstood 45°C. and 48°C. for many hours and were then especially lively. They survived 50°C. and 52°C. for 5–10 minutes and usually recovered when they were cooled, but at 53–54°C. they died in a few minutes. At —2–8°C. they were still alive after 10 days. Larvae were, however, sensitive to drying and to hypotonic and hypertonic solutions. After drying for $\frac{1}{4}$ to $\frac{1}{2}$ hour some larvae recovered. In 1·5 per cent. sodium chloride solution the outer skin rapidly crumpled, but death did not occur for several hours. In 9 per cent. sodium chloride solutions the larvae died in $\frac{1}{4}$–$\frac{1}{2}$ hour. Distilled water killed them in $\frac{1}{2}$–1 hour.

The larvae show astonishing resistance to anthelmintics in common use. Oelkers and Zeissler (*loc. cit.*) found that hexylresorcinol and β-naphthol, in concentrations of 35 mgm. per cent. killed them in 2 hours. Hexaverm (benzene hexachloride), phenothiazine, gentian violet and crystal violet have no effect on them. The alkylcresol in Vermella in concentrations of 15 mgm. per cent. paralysed the larvae in 2–3 hours and in concentrations of 25–30 mgm. per cent. in a few minutes, but the eggs were not killed by this substance. The keratin-splitting ferment in Nematolyt (see Ammon, *Pharmazie*, 1950, v. 5, 57), which dissolves the cuticle of living and dead adult oxyurids, was completely ineffective against the eggs or larvae. *G. Lapage*

Brede, H. D. Enterobius-(Oxyuris-) Kuren mit Gammexan. [**Treatment of *Enterobius* Infections with " Gammexane ".**] *Arch. f. Hyg. u. Bakt.* 1950, v. 133, No. 3, 229–34. [12 refs.]

The author treated 512 persons during 18 months (March, 1949–August, 1950) with " Gammexane ", using " Vermexan " each tablet of which contains 25 mgm. of " Gammexane " (melting point 113·2°C.) and also two " Gammexane " powders with melting points of 112·5°C. and 112°C. respectively. To each of 212 persons 600 mgm. of " Gammexane " were given in 21 days. For 3 days each had 50 mgm. in the morning on an empty stomach ; after an interval of 3 days each had 50 mgm. again for 3 days and this process was repeated for a total of 21 days. Children under 10 had 25 mgm. of " Gammexane " in a similar way. Because " Gammexane " is cumulative (see below), shorter treatments were given to 300 other persons. These had 150 mgm. of " Gammexane " a day for 3 days, in doses of 50 mgm. before meals in the morning, at midday and in the evening. Children had 75 mgm. a day in this manner. Thus adults had a total of 450 mgm. and children a total

of 225 mgm. in the 3 days. The results of this treatment were so good that the author preferred this short course ; the total dose is about 25 per cent. less than that of the longer treatment and the effect on the worms is less marked, but the treatment is simpler and more precisely controlled. The patients were always urged to take the drug on an empty stomach and to avoid oils and fats in order to restrict absorption into the body. Purgatives were not necessary and were not given.

The effect on the worms was studied by means of sticky Cellophane strips used in the manner described by the author. These were stuck on to the anus before rising, before the first stool and before dressing and removed at once for examination on a slide or by folding them double. In studies of more than 2,000 patients the author has found this method to be better than any other. The strips were first applied on the third day after the treatment began and were continued for 90 days. At the beginning 6 were removed at intervals of 3 days and thereafter one was removed each week till the end of the third month after treatment ceased.

Of the 512 patients, three-quarters were free from symptoms, but the Cellophane strips showed that they were infected. The remainder had an active enterobiasis in the Schüffner sense with subjective symptoms. Of the 512 persons 410 (80·1 per cent.) were worm-free after the first treatment. After a second treatment a further 27 were worm-free, so that the percentage of cures rose to 85·3 ; but 72 (14·06 per cent.) remained infected and in 3 (0·6 per cent.) retrofection occurred.

The ages of the 512 patients varied from 2 to 74. There were 46 students, already proven by Cellophane strips to be infected ; 182 otherwise healthy adults, some of whom were relatives of the students ; 64 children in a tuberculosis hospital, aged 3 to 12 years ; and 284 healthy children aged 2 to 14 years, who were treated in their homes (*i.e.*, 228 adults and 284 children, 42 of whom were under 10 years).

Of the 46 students, 42 were free of worms for 3 months after the first treatment and 2 were worm-free after a second treatment. The other 2 showed eggs after 4 treatments, but both were worm-free after daily cold baths and morning sitz-baths. Of the 182 adults, 160 were worm-free after the first treatment and remained so for 90 days. In 3 of them worms appeared on the 37th and 90th day after treatment, so that retrofection had occurred. Among the other 19 eleven were worm-free for 90 days after a second treatment. The remaining 8 were not cured by a third treatment, but 6 of them, after a week of daily morning cold-water baths, became apparently worm-free. The other 2 were still positive.

Of the 220 healthy children treated in their homes, 187 were cured by one treatment and 14 were worm-free after a second treatment ; but 19 were not cured. The results of treatment of the 64 children in the tuberculosis hospital were bad. During 5 months of observation only 21 became free from worms for 40–60 days. The author attributes this to new infections and to the lack of support of the treatment by general hygiene. Successful results lasting longer than 90 days were achieved only in persons who undertook continuous hygienic measures, such as cold rubbing down of the whole body, cold sitz-baths and finger-nail hygiene. These measures were especially effective in adults. This cold-water treatment succeeds because the larvae develop so slowly at temperatures under 20°C. that the eggs die before larvae develop in them.

" Gammexane " operates on the worms only. The author presents evidence which indicates that the eggs of *Enterobius*, and those of *Parascaris equorum* also, are not affected by " Gammexane " ; nor does " Gammexane " affect human infections with *Ascaris lumbricoides*. SCHNEIDER found that

"Gammexane" acts on the mature adults of *Enterobius*, *Lumbricus* and *Tubifex*, causing muscle contractions and resulting paralysis, an effect which the author compares with that of santonin ; and there is also an effect on the nerve ganglia, but "Gammexane" acts but little on the peripheral nerve elements.

The toxicity of "Gammexane" to man is slight, because it is only slightly soluble in water and is absorbed with difficulty. The author refers to his personal experiments in taking "Gammexane" [this *Bulletin*, 1950, v. 47, 392]. He concludes that the cumulative effect of "Gammexane" requires a long time (3 to 14 months) ; but, in order to avoid it, he recommends that not more than two treatments should be given for *Enterobius* infections. Eosinophilia was not seen and there was no sign of allergy ; but a colleague with a sensitive skin developed a dermatitis 48 hours after a dose of 600 mgm. of "Gammexane" which disappeared in 14 days. Neither subjective nor objective signs of toxicity were seen among the 512 patients treated. Those who were not cured by "Gammexane", were also not cured by Lubisan, Oxymors or Contraverm and the author attributes this to a specially vigorous strain of *Enterobius* in them rather than to a specific resistance by the worms to "Gammexane". *G. Lapage*

DEFICIENCY DISEASES

VÉGHELYI, P. V. **Nutritional Edema.** *Ann. Paediatrici.* Basle. 1950, Nov., v. 175, No. 5, 349–77. [63 refs.]

In 1945 the people of Budapest were completely cut off from their normal supply of food from the country during four months of the siege and, owing to the lack of transport, supplies were curtailed for another three or four months. During this period famine conditions existed. In this paper observations are recorded on 109 infants observed at the clinics of the University Department of Paediatrics. Fatty liver and oedema were characteristic features. In the early stages when the only signs were a slight loss of weight and steatorrhea, evidence of failure of the external pancreatic secretions was found. By means of duodenal intubation it was shown that the secretion of first the lipase and the trypsin and then the amylase gradually ceased, beginning about three weeks after the cessation of the milk supply. This occurred before severe evidence of malnutrition was present and could not be prevented by vegetable foods. Later evidence of liver failure developed and finally oedema. There was no improvement following vitamin therapy : only milk in adequate quantities was found to be of any therapeutic value. The development of fibrosis in the liver and in the pancreas led to an irreversible stage, in which death, usually as a result of secondary infection, was the inevitable end.

At post-mortem the livers examined contained much fat, especially at the periphery of the lobules. The macroscopical appearance of the pancreas was, apart from oedema, usually normal. Histologically there was cloudy swelling of the whole parenchyma, all acinar cells were small, atrophic, cornered and separated from each other. A considerable part of the cytoplasm disappeared and only very few, if any, secretory granules were visible. No apparent change could be seen on the islets.

[This paper is of interest to workers in the tropics, because it would appear that these children were suffering from a condition identical with kwashiorkor, yet uncomplicated by the common tropical infections and vitamin deficiency disorders. Both the biochemical observations in life and the histological appearances of the pancreas confirm the suggestion of DAVIES [this *Bulletin*,

1948, v. 45, 633] that kwashiorkor is essentially at first a pancreatic disorder. The epidemiological and therapeutic observations are consistent with the view that these changes are primarily the result of a deficiency of animal protein in the diet of young children. The oedema was probably a separate phenomenon associated with a total calorie deficiency. This paper provides further evidence that kwashiorkor is no tribal African disorder, but a nutritional disease that may arise anywhere. The carrying out of these careful clinical and laboratory studies under the appalling conditions existing in Budapest at the time has been a remarkable achievement.] *R. Passmore*

SALCEDO, J., Jr., BAMBA, M. D., CARRASCO, E. O., CHAN, G. S., CONCEPCION, Isabel, JOSE, F. R., DELEON, J. F., OLIVEROS, S. B., PASCUAL, C. R., SANTIAGO, L. C. & VALENZUELA, R. C. **Artificial Enrichment of White Rice as a Solution to Endemic Beriberi. Report of Field Trials in Bataan, Philippines.** *J. Nutrition.* 1950, Dec. 11, v. 42, No. 4, 501–23, 3 figs.

The progress of a large-scale field trial in rice enrichment for the control of beriberi in Bataan has been reported in this *Bulletin* [1949, v. 46, 390 ; 1950, v. 47, 73, 560]. Beginning in October 1948 a population of 63,000 was supplied with rice, enriched by the addition of " premix ", so that one pound contained 2 mgm. thiamin, 13 mgm. iron and 16 mgm. nicotinic acid. An adjacent area with a population of 29,000 was observed as a control. During the experimental period there was evidence of some infiltration of enriched rice into the control area and also of a slightly raised general standard of living with increased consumption of protective food, but both these extraneous factors are considered negligible.

A clinical examination in both areas and a scrutiny of vital statistics was begun in July 1949. A preliminary survey had been carried out in 1947.

In the area where enriched rice had been almost exclusively eaten for 9 months there was a decline of beriberi incidence of 89 per cent., with a fall of death rate from beriberi from 263 per 100,000 in 1947–48 to 28 per 100,000 in 1949. In the control area the beriberi incidence rose somewhat, while the beriberi death rate, lower than in the experimental area to begin with, remained unchanged. Infant beriberi mortality declined by about half in the experimental area.

Rice mills in other beriberi endemic areas are to be equipped with mixing machinery and a premix manufacturing plant has been erected in Manila. It is hoped that by the end of 1951, 1·8 million other people will be supplied with enriched rice.

[It seems demonstrated that this method of rice enrichment can control beriberi. Doubts must remain, however, of the soundness of a method which replaces with synthetic vitamins only *part* of the nutrients removed in bad milling practice.] *Dean A. Smith*

VENOMS AND ANTIVENENES

VILLIERS, A. Initiations africaines. II. Les serpents de l'Ouest Africain. [**The Snakes of French West Africa.**] 148 pp., 190 figs. [Bibliography.] 1950. Dakar : Institut Français d'Afrique Noire.

This is an excellent monograph bringing up to date what is known of the snakes of French West Africa, a district widely interpreted to include in addition to Morocco, Algeria, Tchad and the Cameroons, territories not under French

administration, such as the Gambia, the Gold Coast, Portuguese Guinea, Sierra Leone and Nigeria. This work is, in fact, a small but comprehensive systematic treatise concerning snakes, venomous and non-venomous, going into details to facilitate identification and to assist travellers, naturalists and, especially, herpetologists. Dread of snakes is general, whether they are venomous or not. In the area mentioned—a very extensive area it will be noted—124 species or sub-species are known and there is little likelihood that many remain undiscovered, but the more accurate geographical distribution is far from settled nor are their habits and habitats, and their food ; in short, many points remain for study.

The present work starts with a general description of the form, colour, scale disposition of the head and body, the skeleton, the bones of the skull, the arrangement of the teeth and venom fangs, the general musculature, the gross anatomy of the digestive, respiratory, circulatory and nervous systems and sense organs, and the poison glands. Then follows a brief section on the native folklore and beliefs regarding snakes, such as the Python Houses at Dahomey and the cult of priests and priestesses to tend and feed the snakes, the religious ceremonies, dances and oracular pronouncements in a resulting trance. Remarks on snake-charmers and their apparent or real immunity, the treatment of snake-bite and, lastly, the capture and despatch to the laboratory of specimens are dealt with, before the author passes on to describe in some detail the characters of each of the species with keys for their identification. The illustration depicting the many points are very clear. There are three appendices : the first a systematic list of the West African snakes ; second, a list of the scientific names arranged alphabetically, and, third, a list of the vernacular names. The whole should prove very useful as a work of reference and appears to be the second of a series of the Institute publications, as an introduction to African herpetology. *H. Harold Scott*

Guidolin, R. & Ferri, R. G. Ação de substâncias fluorescentes sôbre venenos ofídicos. I. Sôbre a atividade tóxica. II. Sôbre o poder coagulante "in vitro". [**Action *in vitro* of Fluorescent Substances on the Toxicity and Coagulating Power of Snake Poisons.**] *Hospital.* Rio de Janeiro. 1950, Nov., v. 38, No. 5, 737–44.

The English summary appended to the paper is as follows :—

"The authors study the action of fluorescent substances on the snake poison of the genus *Bothrops*.

"They demonstrated that, Riboflavin, Quinine sulfate, γ-Eosin, Na-Fluorescein and K-Chlorophyllinate are capable of counteracting the toxicity of snake poison in presence of light but not in the dark, maintaining almost completely unaltered its power of coagulating the blood plasma (in vitro).

"It is concluded that the mechanism of the reaction is analogous to the photoinactivation of indoleacetic acid by the substances mentioned above."

Béréni, J. Quelques remarques sur la biologie d'un scorpion saharien *Orthochirus innesi* E. Simon. [**On the Biology of a North-African Scorpion, *Orthochirus innesi*.**] *Arch. Inst. Pasteur d'Algérie.* 1950, Dec., v. 28, No. 4, 509–11.

At the Pasteur Institute, Algiers, are several specimens of this scorpion, originally described by Simon in 1910. It has now been studied again and in more detail. It is easily recognizable ; it is small, never more than 3 cm. in length, of a dull black colour with greenish reflections and yellow terminations to the legs. It lives in gardens, often with *Androctonus amoreuxi*, but, whereas

the latter may enter dwellings, the former does not. A few are seen in April, many more in May and later, in the shaded seclusion of palm leaves or under vegetable débris, or in holes in the soil ; they are often congregated 6 or 7 together. If uncovered they run for shelter. Whether in movement or in repose the tail is kept strongly flexed with the sting curved over the front of the cephalothorax. It is very quick in its movements and runs rapidly up a wall In winter it penetrates deeper into the soil.

The local inhabitants express great fear of its sting, but this is said to be largely pretence, for they handle them carelessly ; the stinging causes collapse and vomiting, but apparently not very severe. Stinging by it is not common ; the reasons given for this are that it is very quick in running for cover, that it hides in places where it is not likely to be disturbed and it comes out mainly at night when few people are about.

In the district, In Salah, 43 cases of scorpion sting have been noted since 1942, but only a proportion, and that uncertain, is due to *O. innesi* and the general conclusion is that it rarely stings man and when it does it is not very serious.

H. Harold Scott

WATERMAN, J. A. **Two Cases of Scorpion Poisoning characterised by Convulsions with Electrocardiograms.** *Caribbean Med. J.* 1950, v. 12, No. 5, 127–9, 3 figs.

DERMATOLOGY AND FUNGUS DISEASES

LE GAC, P., LAGARDE, J. & MULET, M. Papillonite en Oubangui-Chari (A.E.F.). [**Dermatitis due to a Moth in Oubangui-Chari, French Equatorial Africa.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 718–20.

In May, 1950, a large number ("several hundred", say the authors) of Europeans living in Bangui were suddenly attacked with intolerable itching, the origin of which was for a time in doubt and was ascribed to scabies, to urticaria, to food-poisoning, etc. The itching was at first localized, without any obvious lesions, and within 48 hours became generalized as a patchy erythema with papules the size of a pin's head, intensely irritating. The patch did not extend but disappeared in 2–3 days. The neck was most often involved, then the arms and lastly the waist.

The cause proved to be a moth, identified later as *Anaphe venata*, which flew in, attracted by the strong electric light and then took shelter in the neck of the vest. They had hatched out in enormous numbers after the recent rains, and came into contact with the vests and sleeves of the inhabitants. The body of the moth is covered by readily detachable hairs, as is also the larva, and these hairs have secondary prickles (*aiguillons*) and they float in the air and settle on exposed parts.

Experimental application of the hairs produced all the symptoms referred to. Africans were similarly affected by experiment, so they are not immune, and their escaping, while Europeans suffered, is ascribed to the fact that in African dwellings oil lamps and lanterns are used for illumination and the light is too dim to attract these moths in any numbers [but this would not protect them from floating hairs]. Inquiry brought out the fact that these cases occurred not only in Bangui but all along the Oubangui riverine area. *H. Harold Scott*

GUIMARÃES, N. Micose de Lutz na Bahia. A propósito de um novo caso. [**A New Case of Lutz's Disease in Bahia.**] *Hospital.* Rio de Janeiro. 1950, Nov., v. 38, No. 5, 693–8, 5 figs.

The English summary appended to the paper is as follows :—

" The author presents a new case of Lutz' disease (South American Blastomycosis) in Bahia, the twenty third in this State. The patient, a 42 years old man presented extensive pulmonary, and tegumentary lesions (face and soft palate). In the material collected by scraping the palatine lesion and in the histopathologic examination of the facial lesion the Paracoccidioides brasiliensis was found."

SCHWARZ, J. & MUTH, J. **Coccidiomycosis : a Review.** *Amer. J. Med. Sci.* 1951, Jan., v. 221, No. 1, 89–107. [292 refs.]

SLIM VILLEGAS, V. J. & ARANDA REYES, B. Breve informe sobre las pruebas alergicas a la coccidioidina e histoplasmina en el Valle de Mexicali, Baja California. [**Brief Report on Coccidioidin and Histoplasmin Allergy Tests in the Mexicali Valley, Mexico.**] *Bol. Oficina Sanitaria Panamericana.* 1951, Jan., v. 30, No. 1, 18–25, 4 charts. English summary.

CONAN, N. J., Jr. & HYMAN, G. A. **Disseminated Coccidioidomycosis. Treatment with Protoanemonin.** *Amer. J. Med.* 1950, Sept., v. 9, No. 3, 408–13, 2 figs. [32 refs.]

" A young white woman, while in an endemic area for C. immitis, conceived and delivered a normal baby who has remained healthy. Two months later a granulomatous but asymptomatic coccidioidal endometritis was discovered without a preceding history of respiratory infection or cutaneous lesion, at which time x-ray examination of the chest was normal. Three months later symptoms of generalized disease developed. Pulmonary lesions did not appear until nearly two years after the establishment of uterine infection. During this time repeated coccidioidin skin tests were negative, but a facial cutaneous coccidioidal granuloma appeared, followed by marked eosinophilia. Two and one-half years from its onset the disease became fulminating and terminated in death despite the use of protoanemonin which *in vitro* prevented the growth of the fungus isolated from the patient's blood. It is suggested that the uterus may have been the portal of entry of infection in this patient."

TROPICAL OPHTHALMOLOGY

BOASE, A. J. **Trachoma.** *East African Med. J.* 1950, May, v. 27, No. 5, 187–95.

Trachoma is discussed in a clinical address by Boase. He points out that the prevailing belief is that the active principle of trachoma is a virus of the psittacosis and lymphogranuloma venereum group. The virus, however, has never been cultivated and its existence is inferred from the association of trachoma with the so-called inclusion bodies. These inclusion bodies are indistinguishable from those found in inclusion blenorrhoea or non-gonococcal conjunctivitis of infants, swimming-bath conjunctivitis and follicular conjunctivitis with inclusions. It is very probable that the trachoma virus is strictly epithelio-tropic and that it produces the sub-epithelial changes by liberation of soluble toxic substances. The author points out that the mode of onset with a generalized lymphocytic infiltration is the one more commonly seen

in hospital practice and that it is the more virulent type. He thinks that it occurs when there has been a simultaneous infection with the trachoma virus and an acute bacterial conjunctivitis ; the tarsal conjunctiva presents a red velvety surface no different from that seen in a bacterial conjunctivitis.

He regards trichiasis as a passive result of the shrinkage of scar tissue and considers that it and entropion are just different stages of one and the same process. He is of the opinion that many long-standing very hyperaemic cases never develop trichiasis, and has yet to see a case in which the Meibomian orifices were not affected in varying degree : they came to face the eyeball instead of being opposed to their opposite numbers in the lower eyelid.

The author points out two signs which are reliable indications for a spot diagnosis of trachoma. The first is the so-called trachomatous ptosis, which he considers is the outward sign of a purposeful protective spasm of the orbicularis muscle. The second sign is dependent on the change in the contours of the lid margin whereby it assumes a modified S-bend, the medial portion arching forwards while the lateral half presents a downward convexity. His explanation for this is that the medial portion, being relatively free of rigid tarsal tissue, is pulled up to an undue extent by the levator acting through its cutaneous attachment, whereas the outer portion maintains its normal conformation because of the structural support afforded by the main bulk of the tarsal plate. He refers to yet another sign which so far has commanded little attention : this is a curious melanotic pigmentation of the palpebral conjunctiva, which is a very common finding in trachoma seen in Uganda. Sometimes this staining is nothing more than a few spidery lines ; at other times it is a real " ink-blotch " covering a third or more of the tarsal plate ; in yet others it gives an impression that the surface of the fornix has been lightly smudged with lamp-black.

In treatment the author considers in the first stage the important thing is to prevent a secondary bacterial conjunctivitis and for this purpose prophylactic drops of zinc sulphate are probably as good as any other antiseptic. Like most ophthalmologists he is of the opinion that the sulphonamides and penicillin have no specific effect in trachoma and do no more than clear up the associated bacterial infection. In the second stage if surgery is not indicated he recommends lid-painting with 2 per cent. silver nitrate or 30 per cent. sodium sulphacetamide. If surgery is required he advocates the radical operation of tarsectomy in which most of the upper tarsus and its adherent diseased conjunctiva are excised.

Brief reference is made to dramatic effects obtained in a few cases with the use of aureomycin and one such is described. *E. O'G. Kirwan*

STEWART, F. H. & BADIR, G. **Experiments on the Cultivation of Trachoma Virus in the Chick Embryo.** *J. Path. & Bact.* 1950, July, v. 62, No. 3, 457–60.

Trachomatous material was inoculated on to the conjunctivae of a grivet and a baboon, and follicles appeared after about 30 days. The lesions were rubbed with swabs under aseptic conditions ; the swabs were extracted with Ringer's solution and the extract was injected into the air sacs of a number of fertile eggs on the 5th or 6th days of incubation. The eggs were then incubated at 34° to 35°C. for 3 to 12 days, and the yolk sacs were harvested and used for a further passage in a baboon ; follicles appeared after one month. By a repetition of this procedure the infection was carried through 4 monkey and 3 egg passages. In a further experiment the yolk sac of an egg which had been inoculated with monkey material was not infective when tested in a baboon, but infection was readily produced when material from the yolk sac was carried through a further egg passage. The authors point out that eggs inoculated with monkey

material usually remain free from bacterial contamination, and that a preliminary passage in monkeys is therefore preferable to the inoculation of material directly from human cases. *D. J. Bauer*

Arakawa, S. & Kitamura, O. **Experimental Studies on Trachoma (Preliminary Report).** *Japanese J. Exper. Med.* 1950, July 30, v. 20, No. 5, 579–86.

Eight strains of virus were obtained by the intracerebral inoculation of mice with material from the conjunctival lesions of eight patients with trachoma. The strains became fully adapted to mice after 3 to 9 passages, and attained a titre of 10^6. The incubation period of the disease in mice was 3 to 5 days ; signs of cerebral irritation then developed, and conjunctivitis was frequently observed. No elementary bodies could be found in smear preparations from organs of infected mice. The virus was not neutralized by normal human sera, nor by vaccinia, rabies, varicella, Japanese B encephalitis, measles or dengue antisera. It produced follicular conjunctivitis after subconjunctival inoculation of a rabbit, and a similar condition was produced in 3 human volunteers. *D. J. Bauer*

Bierent, P. Note préliminaire sur la stibiothérapie dans le trachome et certaines affections oculaires. [**Preliminary Note on the Treatment with Antimony of Trachoma and some other Eye Diseases.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 28–32.

A preliminary note on the treatment of trachoma and certain other diseases of the eye with antimony is discussed by the author. In his investigations on 35 cases he has used a solution of the pentavalent antimonial, methylglucamine antimoniate [Glucantime, 2168 R.P.]. The antimony is given parenterally : in old cases intramuscularly (0·3 gm. daily for 10–12 days) and in early cases subconjunctivally ($\frac{1}{4}$ to $\frac{1}{2}$ cc. of a 30 per cent. solution every 3 to 4 days). In cases of trachoma he is of opinion that antimony therapy produces favourable results whether given intramuscularly or subconjunctivally and in certain acute cases the results are quick. He has also found it useful in improving the vision in corneal opacities and in some cases of secondary glaucoma to relieve pain and tension. He is continuing his studies with different doses of Glucantime and with other preparations of antimony. *E. O'G. Kirwan*

PROTOZOOLOGY : GENERAL

Walenz, H. & Westphal, A. Toxoplasmose bei Kindern. [**Toxoplasmosis in Children.**] Reprinted from *Monatsschr. f. Kinderheilkunde.* 1950, v. 98, No. 8, 329–36, 7 figs. [29 refs.]

The finding by the authors in 1949 of 8 cases of toxoplasmosis in children, in addition to those reported by others, shows that this disease is more common in Germany than has formerly been suspected. With the view to providing further data on the clinical picture and serological diagnosis of toxoplasmosis, a detailed account is given of 4 cases in which the diagnosis was established beyond all doubt on clinical, serological and parasitological grounds, including —in one case—the transmission of the parasites to rodents. Three of the cases occurred in infants with typical symptoms of congenital toxoplasmosis, *viz.*, hydrocephalus, changes in cerebrospinal fluid[c.s.f.] (xanthochromia, high albumin content and lymphocytosis), nervous signs and chorioretinitis. In the

fourth case (a 4-year-old child) only changes in the c.s.f. and chorioretinitis were clinically characteristic. However, in none of these cases was there any radiological evidence of cerebral calcifications. The Sabin-Feldman dye test was positive both in the patients and in their mothers, and in two cases parasites were detected in the sediment of the c.s.f.

In a general discussion on the clinical picture of human toxoplasmosis, the following variants of the disease are recognized :—

I. Antenatal infection : (1) still-born infants, (2) congenital toxoplasmosis with encephalomyelitis and chorioretinitis.

II. Postnatal infection : (1) acquired toxoplasmosis in older children, (2) acute toxoplasmic infection in adults, (3) chronic encephalitis and chorioretinitis in adults, (4) symptomless (latent) infection. [See also this *Bulletin*, 1950, v. 47, 1130, 1227.] *C. A. Hoare*

Piekarski, G. & v. Törne, H. Zur Parasitologie, Pathologie und Serologie tödlicher Infektionen mit *Toxoplasma gondii*. [**Parasitology, Pathology and Serology of Lethal Infections with** *Toxoplasma gondii*.] *Klin. Woch.* 1950, Sept. 15, v. 28, Nos. 35/36, 606–9, 6 figs. [11 refs.]

The authors describe the results of the examination of tissues and organs of two infants, 6 and 9 months old, who died of toxoplasmosis which had been diagnosed on clinical grounds. While they were still alive, toxoplasm-antibodies were demonstrated in one of the infants (*M*) and in its mother, but in the other infant (*R*) serological tests could not be carried out. Case *R* showed histopathological changes peculiar to the nervous type of the disease, which is characterized by meningo-encephalitis with chorioretinitis pigmentosa. Toxoplasms were abundant between the inner and outer nuclear layers of the retina, one or two pseudocysts being present practically in every section, but no tissue changes could be seen in their neighbourhood. Pseudocysts were also found in the brain. In case *M* the histopathological changes showed features common to the nervous (hydrocephalus, leptomeningitis, etc.) and visceral forms of the disease. Toxoplasms were scattered in small numbers or concentrated focally in the lungs and kidneys. In both infants a thorough search failed to reveal typical calcifications in the brain. It is suggested that these develop later in the course of a latent infection. These are the first two cases reported from Germany, in which the clinical diagnosis of toxoplasmosis was confirmed by the finding of the parasites. The rest of the paper is devoted to a description and evaluation of Sabin and Feldman's dye test for toxoplasmosis. *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Brown, A. W. A. **Factors in the Attractiveness of Bodies for Mosquitoes.** [Correspondence.] *Nature*. 1951, Feb. 3, 202.

The relative importance of temperature, moisture, carbon dioxide and of different types of clothing in attracting mosquitoes to animals was tested with dummies in Ontario and Labrador. The dummies each consisted of a stainless steel tank holding 100 lb. of water heated to 98°F. (37°C.). Each dummy was

clothed in a felt shirt beneath a black crêpe jerkin, and a head could be added with an orifice for the exhalation of carbon dioxide and other gases. The mosquitoes involved were *Aëdes intrudens* and *Aëdes trichurus* in Ontario and *Aëdes punctor, Aëdes pionips* and *Aëdes communis* in Labrador.

At air temperatures higher than 60°F. (15·5°C.) a dummy with moist clothing was more attractive than one with dry clothing, whereas at lower temperatures the reverse was the case. Tanks with only a crêpe jerkin were more attractive at body temperatures than at lower ones, but if the tanks had felt shirts too the difference was not apparent. The greater attractiveness of the warmer dummy was accentuated by moistening the clothing. Clothing soaked in water saturated with carbon dioxide was not more attractive than normally wet clothing, but clothing moistened with human sweat was more attractive than clean clothing of an equal moisture content.

When carbon dioxide (10 per cent.) was passed through the head at the rate of 2 litres a minute attractiveness was increased ; 100 per cent. carbon dioxide increased attractiveness even more, but air alone had no effect.

White clothing was less attractive than black, and pale shades of red and blue less than dark shades. Green was less attractive than red or blue, and blue less attractive than red, but pale shades of blue were more attractive than pink shades. Satins were less attractive than broadcloth or crêpes.

J. H. Sudd

de Bustamante, F. M. & Pires, W. da M. Armadilha " Dawn Trap " de Shannon. De seu emprêgo para verificação da durabilidade do efeito tóxico residual de inseticidas. [**The Use of the Shannon Dawn Trap to assess the Duration of Residual Toxicity of Insecticides.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, July, v. 2, No. 3, 261–5. English summary.

The following is substantially the authors' English summary :—

A Shannon dawn-trap was used to observe the duration of toxicity of DDT against anopheline mosquitoes [species not named]. A 5 per cent. DDT emulsion was sprayed on the inner surfaces of the trap compartment at the dosage of 3 gm. of DDT per square metre. A horse, as bait, was put into the stable compartment at twilight. Each morning for nine months all anophelines dead and alive found inside the trap compartment were counted at 7, 9 and 11 a.m., and recorded.

A study of the results shows that the screened side of the trap loses DDT more rapidly than the surfaces of the walls and ceiling. This is due to frequent washing by rain and exposure to wind, while on the walls and ceiling, DDT particles were visible and the toxic effect was still present 9 months after treatment. The observations made in the dawn trap about the duration of the residual effect of insecticides cannot therefore be applied to human dwellings inside which conditions are so different.

H. S. Leeson

Winteringham, F. P. W., Loveday, Patricia M. & Harrison, A. **Resistance of Houseflies to DDT.** *Nature.* 1951, Jan. 20, 106–7.

Recently, American workers have shown that DDT can be rapidly metabolized to an inactive compound in the milkweed bug (*Oncopeltus fasciatus*) ; also that DDT-resistant houseflies possess this power of metabolizing DDT to a greater degree than do normal susceptible flies. This does not entirely explain the survival of the resistant flies, since (1) the power of rapid metabolism does not protect the milkweed bug from death, (2) the quantity of unchanged DDT

which can be extracted from living resistant flies is more than enough to kill normal ones and (3) the metabolism of DDT by the resistant flies is quite slow.

The authors have experimented with a bromine analogue of DDT $(BrC_6H_4)_2CH.CCl_3$, containing radioactive bromine. This compound has similar insecticidal properties to DDT and the radioactive emissions allow detection and estimation of minute quantities. Furthermore, a method of tracer chromatography enables the separation and estimation of analogues, so that some possible end-products can be identified. (See WINTERINGHAM *et al.*, *Nature*, 1950, Dec. 9, 999.) These methods allow valid results to be obtained with small groups of five flies.

Drops of acetone containing 50 μgm. of Br-DDT were applied dorsally to individual resistant flies and 2 μgm. DDT to susceptible flies. The amounts absorbed into the flies after 48 hours were, respectively, 6 per cent. and 50 per cent. But if equal amounts (2 μgm.) of DDT were applied, the absorption by the resistant flies was of the same order (40 per cent.) as with susceptible ones. When 0·6 μgm. of DDT in acetone was injected into both types of fly (*i.e.*, about twice the lethal dose for the susceptible race) there was no metabolism of DDT observed in susceptible flies. In the resistant ones, 23 per cent. of the bromine-DDT was recovered as the non-insecticidal compound $(BrC_6H_4)_2C : CCl_2$ after 5 hours, and 57 per cent. after 24 hours. There were no traces of other metabolites. If the bromine-DDT was added to flies killed by heat or disintegrated in a pestle and mortar, no metabolism occurred. Also, if the pyrethrum synergist piperonyl cyclonene was added to the acetone solution before injection (at the rate of 1 per cent. to the bromine-DDT) the metabolism was suppressed. [It is not stated whether the flies died or not.]

As it seemed possible that the mere presence of the metabolite $(BrC_6H_4)_2C : CCl_2$ might confer resistance, some of it was injected into the susceptible flies together with the Br-DDT ; but no evidence of resistance was observed. *J. R. Busvine*

DE MEILLON, B. & HARDY, Felicity. **Fate of *Cimex lectularius* on Adult and on Baby Mice.** [Correspondence.] *Nature*. 1951, Jan. 27, 151–2.

The authors are interested in the relation between blood-sucking insects and mammal hosts, particularly in the question whether the baby mammal is as good a host as the adult.

Some bed bugs were fed throughout life on baby mice (which are used immediately after being taken away from the mother), and others on adult mice. There was no difference between the two, either in the proportion of bugs that fed or in the rate of development. It was however found that on the adult mouse bugs laid significantly more eggs than on a baby mouse. The group fed twice on a baby mouse was then fed once on an adult, and the number of eggs increased forthwith. This may be in some way related to haemolysis in the new-born.

No such difference was discovered in bugs fed on adult and baby multimammate mouse (*Mastomys*), which is however an indifferent host for the bug. *P. A. Buxton*

ZUMPT, F. & PATTERSON, P. M. **The Ethiopian Species of *Hypoaspis* Subgen. *Androlaelaps* Berlese (1903), with Description of a New Species [Acarina].** *South African J. Med. Sci.* 1950, Oct., v. 15, No. 3, 67–74, 4 figs.

CLARK, E. W. & MORISHITA, F. **C-M Medium : a Mounting Medium for Small Insects, Mites, and other Whole Mounts.** *Science*. 1950, Dec. 29, 789–90.

The authors describe a mounting medium suitable for whole insect larvae or adults and various other small animals. The formulae consists of :—

Methocellulose	5 gm.
Carbowax 4,000	2 gm.
Diethylene glycol	1 ml.
95 per cent. ethyl alcohol ...	25 ml.
Lactic acid	100 ml.
Distilled water	75 ml.

The paper contains directions for making this up and details about the previous treatment that is desirable for certain types of animal. For instance mosquito larvae mount well in this material after being passed through cellusolve. It is evident that one may transfer specimens to the mounting medium from a great variety of organic substances.

The medium possesses many advantages. For instance, it does not turn yellow and crystals do not form in it. The refractive index is 1·428, which is said to be very suitable. *P. A. Buxton*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. Colonial Research 1949–50. **Colonial Medical Research Committee. Fifth Annual Report (1949–1950)** [HIMSWORTH, H. P., Chairman] (pp. 77–101). Cmd. 8063. 155 pp. 1950. Oct. London : H.M. Stationery Office. [3*s*. 6*d*.]

This report reviews the progress of work in the various schemes financed by the Committee. Most of it either has been or will be published in scientific journals, from which it will be abstracted in this *Bulletin* and it is sufficient here to indicate the scope of the work fostered in this way. It is broad, it covers many different aspects of tropical medicine, aetiological, curative and preventive, and it shows no bias towards any subject or type of study. It includes studies of the following subjects :—

Leprosy.—The use of the sulphone drugs in treatment.

Loaiasis.—An elaborate field investigation into all aspects of this infection in the British Cameroons.

Filariasis.—A Filariasis Research Unit has been established in Tanganyika with the object of devising means for the control of *Wuchereria bancrofti* infection. Clinical, pathological, therapeutic and control studies are now in progress.

Malaria.—The new East African Malaria Unit is partly financed by the Committee. New studies of the entomology of the disease have been started in Jamaica. Chemotherapeutic trials continue in Malaya and have been supplemented by trials of insecticides in the laboratory and the field. Epidemiological studies in North Borneo, which have already yielded interesting results, are being further elaborated.

Survey.—The East African Medical Survey Unit has been established in Tanganyika, and some preliminary work undertaken.

Virus Diseases.—The Committee has now assumed responsibility for the Virus Research Institutes in Entebbe and Lagos. These were both founded by the Rockefeller Foundation and are now passed to the Committee's control. Their ability to maintain the high reputation they have already established will be a severe test of the quality of the Committee's work.

Physiology.—Research into hot-climate physiology continues in Nigeria and has been supplemented by studies of the origin of acclimatization in the

African, whether hereditary or acquired. In Makerere College, Uganda, haematological, biochemical and nutritional standards of the normal African are being studied.

Precipitin sera.—The Lister Institute has undertaken the study and preparation of precipitin sera for entomological and other studies in the tropics.

Relapsing Fever.—Entomological studies are being carried out in Kenya.

Scrub Typhus.—The studies of the epidemiology of Malayan scrub typhus have been further advanced. Work on treatment and drug prophylaxis, which has already been brilliantly successful, was continued.

Nutrition.—A Nutrition Unit has for some time been established in the Gambia and is associated with the Human Nutrition Research Unit of the Medical Research Council Laboratories in London. The work is varied and includes an experimental project for the assessment of nutrition and for its improvement by agricultural means, which is now yielding valuable results.

The Committee has participated in the establishment of a Bureau of Medical Research in Nairobi, which will act as a liaison and organizational centre, and has agreed to take control of the Sir Alfred Lewis Jones Laboratory in Sierra Leone, which for twenty years was the chief research centre of the Liverpool School of Tropical Medicine.

The Committee has already established itself as a major force in tropical medical research, and may be congratulated on the breadth and value of the work it has undertaken in the short time it has worked.

G. Macdonald

LALOUEL, J. Sur l'état sanitaire des Babinga. [**The Sanitary Condition of the Babinga.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 714–18.

This is an attempt to exculpate the Babinga, who appear to be a forest-roving nomadic tribe of the lower Ubangi, from the popular accusation that they are the reservoir of infections which afflict the more stabilized village folk.

Figures are adduced to show that in them the incidence of sleeping sickness is definitely less than among the villagers who reside near water-courses; this is what would be expected from the rarity of tsetse flies in the depth of the forest.

The incidence of leprosy does not appear to be any greater though they are accused of hiding cases of leprosy in forest camps. Yaws, on the other hand, appears more widespread, possibly owing to the fact that the Babinga are less able to get modern treatment.

Thus these "gipsies" hardly deserve the suspicions of their more civilized neighbours.

C. C. Chesterman

FAUST, E. C. **Disease of Domestic Animals and Human Welfare.** *Acta Tropica.* Basle. 1950, v. 7, No. 4, 289–97.

In this address to the Division of Anthropology of the Seventh Pacific Science Congress, held in New Zealand in 1949, Professor Faust discusses the dependence of man upon his domesticated animals, the loss of food due to the diseases which these animals suffer, their rôle as reservoirs of human disease and methods of dealing with this general and important problem. Disease is defined as "any state which departs from the optimum functioning of the organism", so that faulty breeding and selection of stock and the failure of races and strains to become acclimatized to environments into which they are transported and the artificial conditions created by man are among the factors discussed. The losses inflicted by disease on the world's food supply are slowly becoming better known and Professor Faust quotes striking figures

of them in this address, among which are the loss of a billion dollars a year by the United States and proportionate losses by other countries. Although some sort of estimate of the losses due to the actual deaths of farm stock can be made, it is probably impossible to estimate the losses due to the failures of normal development caused by chronic disease and many veterinarians think that these losses are greater than those directly attributable to death. To them we must add the considerable losses of condemned meat, liver and similar animal products. In an address by one of the world's leading parasitologists it is perhaps natural that many of the examples of the effects of animal disease upon food supplies and of the part played by farm stock as reservoirs of human disease are parasitological ; but Professor Faust certainly says enough to convince the reader how necessary are the remedies that he suggests. He believes that the solution of the general problem lies in better conservation of the soil, scientific development of agriculture in unexploited tropical regions and the breeding throughout the world of healthier stocks of animals adapted to their various environments and protected from disease. Failure to solve the problem will bring human hunger and starvation, wars of aggression and the eventual destruction of human civilization. *G. Lapage*

BOOK REVIEWS

CHESTERMAN, Clement C. [O.B.E., M.D. (Lond.), M.R.C.P., D.T.M. & H. (Camb.)]. **Tropical Dispensary Handbook. An Aid to the Training and Practice of Native Medical Assistants and for the Guidance of all engaged in Medical Practice in Rural Dispensaries in the Tropics.** Fifth Edition, revised. pp. xi+313, 26 pls. (2 coloured). 1951. London : United Society for Christian Literature, Lutterworth Press, 4 Bouverie Street, E.C.4. [12/6]

Dr. Chesterman's handbook was first published in 1928, and the facts that this fifth edition has been called for, and that the various editions have been translated into French and Portuguese, are sufficient evidence that it has been widely acclaimed.

In this revised edition Chesterman has retained the same number of pages of text as before, except that he has added a series of 26 excellent photographs, on 7 plates, which were not in the previous edition. The series of 8 photographs of the lesions of yaws, taken and supplied by Dr. C. J. Hackett of the Wellcome Museum of Medical Science, are superb examples of the art of medical photography. They are also strong emotional inducements to reduce the horrible effects of this disfiguring disease.

Dr. Chesterman has tackled the problem of revision with considerable ingenuity. In general the clinical descriptions of the diseases, and much of the other information about them, remain the same as before, but the sections on treatment of many conditions have needed much modification since 1944. Here and there the substitution of a new sentence for one that has become out of date has been enough, but in other places whole paragraphs and even pages have been re-written, though the total information about each disease has been kept in the same amount of space as before. This must greatly have reduced the cost of issuing a new edition, without unduly limiting the amount of new information given. In this way an astonishing amount of fresh and important material has been incorporated, in very few words.

The lists of drugs, injections, etc. towards the end of the book have been amended to include new preparations, including penicillin, aureomycin and

chloromycetin, but on p. 251 the only reference to streptomycin gives an oral dose, without mention of injection ; this may be misleading, for on p. 127 the treatment of tuberculous meningitis is "*Streptomycin* in doses of 1 g. daily for many weeks", but the route is not stated. References to the antibiotics are given at appropriate places in the text, and the same is true of other new drugs such as the sulphones in leprosy and hetrazan in filariasis.

This handbook covers much more than the "tropical" diseases—Section I deals with medical diseases of all kinds, including the parasitic diseases ; Section II deals with surgical diseases ; Section III with pharmacology, and Section IV with laboratory procedures.

The style is terse and in parts almost telegraphic ; the book is, in fact, a collection of notes which a teacher may use as a text for lessons, and to which a student may turn for reference. So long as this method does not lead to obscurity its drawbacks are superficial. The book can be thoroughly recommended for the purpose for which it was prepared namely that of training dispensers, and as a book of reference to which they can turn.

Charles Wilcocks

VARGAS, Luis & MARTINEZ PALACIOS, Amado. **Estudio taxonómico de los mosquitos anofelinos de México.** [Taxonomic Study of the Anophelines of Mexico.] pp. viii+143, 62 figs. [Bibliography.] 1950. Mexico, D.F. : Secretaria de Salubridad y Asistencia, Oficina de la Campaña Nacional contra el Paludismo.

This work is not, as its title would suggest, a taxonomic study in the full sense. It is a handbook for identification. As such it can be recommended. It is well illustrated and well produced. Descriptions are given of 24 species and one sub-species of *Anopheles* and one species of *Chagasia*. The former are grouped in the sub-genera *Anopheles* s.str., *Coelodiazesis*, *Nyssorhynchus* and *Kerteszia*. The sub-genus *Russellia*, previously erected by the senior author, is here synonymized with *Coelodiazesis*, a conservatism which is in welcome contrast to his handling of the sub-genera of *Aëdes* (this *Bulletin*, 1950, v. 47, 668 and *Rev. Inst. Salubridad y Enfermedades Trop.*, 1950, v. 11, 61). The descriptions appear to be fully adequate for identification though not for comparative study or for the study of variation. They are supplemented by keys to female adults, male terminalia, pupae, fourth instar larvae and eggs and by numerous figures. Full descriptions of pupae are not given but the abdomen of *Anopheles aztecus* is figured in detail. The figures are clear and, in general, well reproduced but those of the wings are somewhat over-reduced. There are very short sections on distribution and habits and on the history of mosquito studies in Mexico and rather fuller sections on the general morphology of the various stages.

P. F. Mattingly

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.

(272) Wt. P27/388 8/51 S.E.R. Ltd. Gp. 432